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MEDICAL COMMUNICATIONS

OF

THE MASSACHUSETTS MEDICAL SOCIETY.

WITH AN APPENDIX.

CONTAINING THE PROCEEDINGS OF THE COUNCILLORS AND OF THE SOCIETY.

VOLUME XXI.

IN THREE PARTS.

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ARTICLE I.

THE ANNUAL DISCOURSE.

THE SANCTITY OF MEDICINE.

By THOMAS F. HARRINGTON, M.D.
OF BOSTON.

DELIVERED JUNE 10, 1908.

NOTE.—At an Adjourned Meeting of The Massachusetts Medical Society, held Oct. 3, 1860, it was

Resolved, "That The Massachusetts Medical Society hereby declares that it does not consider itself as having endorsed or censured the opinions in former published Annual Discourses, nor will it hold itself responsible for any opinions or sentiments advanced in any future similar discourses."

Resolved, "That the Committee On Publications be directed to print a statement to that effect at the commencement of each Annual Discourse which may hereafter be published."

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THE SANCTITY OF MEDICINE.

Mr. President and Fellows
of The Massachusetts Medical Society: —

To be requested to give this time-honored address is a privilege and an opportunity that comes only once in a man's life time. In the century of annual occasions devoted to this custom The Massachusetts Medical Society has ever kept before its members the high ideals and the sacred objects of her founders. She has taken this means usually to urge forward the efforts of her members for higher standards in medical education; to stimulate measures of preventive medicine; to advocate ways and means for the preservation of the public health. At times she has directed her resources towards the eradication of some social or medical heresy, not always outside her own fold, and in no other field of her endeavor has she fought more vigorously nor more uncompromisingly. Principles, not policies, have been her standard. Compromise found no resting place in her councils. Calm, judicious deliberation preceded action always, and after that action once became the will of the Society all personal dissensions and opposition disappeared in the unity of the whole. As we examine these various problems in the light of history, their inception and growth centre about some period of reaction against extreme methods of therapeutics, or they were part of a wave of unrest incidental to some new discovery or new invention, or quite often perhaps they were the outward expression of some loss of equilibrium in the stability of the art and science of medicine itself.

To-day it is evident on all sides that we are confronted with problems in the practice of medicine, the rightful solution of which is going to decide whether the brilliant discoveries of the past thirty years are to give their full immediate blessings to mankind, or whether confusion and chaos must reign until another generation corrects the faulty perspective of the profession and the laity of our day. Following the traditions of this revered and famous medical society, I would present some of these problems of to-day under the title

THE SANCTITY OF MEDICINE.

From time immemorial medicine has been given a place of dignity and sanctity accorded to no other science. No age, nor people, nor state of civilization has ever existed that does not bear testimony to the profound respect for him who bound up the wounds, set the broken bones, healed the diseased state, and restored the blessings of health. In the earliest times the physician was deified, almost supernatural powers were ascribed to him, and death even was supposed to lose its invincibility when combating with the physician. Much as we have strayed otherwise from the early conception of medicine and of the physician, there is manifested by the laity to-day that simple faith, that belief in authority which has always been such an important factor in the curing of many diseases. This has ever given to medicine a true sanctity among the sciences. Let us then review briefly our proud ancestry in medicine, the source from which has come this unquenchable fountain of hope in sickness and in disease.

Medicine may be traced to two separate origins,—Greek and Hindu. The date of its origin in Greece is lost in fable. According to Greek mythology the sun-god Apollo presided over medicine, and Chiron, one of the Centaur race, was metamorphosed into a horse, and while hunting in the mountains and forests with the goddess Diana, he acquired

a knowledge of plants as well as of astronomy. Chiron is supposed to have been a prince of Thessaly and to have lived prior to the acquisition of the Golden Fleece and the siege of Troy. His grotto at the top of Mount Pelion became a famous school, and here he instructed the Argonauts in medicine, and was likewise the teacher of Bacchus, Hercules, Æsculapius, Machaon, Æneas, and Achilles, and other heroes of that remote age. He taught medicine and surgery, music and gymnastics, and is said to have employed music as a remedial measure in sickness. Among Chiron's pupils was Æsculapius (B.C. 1200) who so excelled in the art of medicine the teachings of his master that he was deified by the Greeks, and his followers became the priests of the shrines erected in honor of their ancestor. Two of these, Machaon and Podaleirios, sons of Æsculapius, were at the siege of Troy (B.C. 1184) and were immortalized by Homer.

The origin of medicine was no less sacred among the Hindus. Dhanwantari (B.C. 1100?) represents in India the place occupied by Æsculapius among the Greeks. According to Brahmanical mythology the gods churned the ocean for the purpose of recovering for mankind the comforts and conveniences lost during the Deluge. Among the fourteen precious gifts restored was the health-giving Dhanwantari, the celestial physician. This fable goes on to relate how medicine was revealed by Brahma to Dhanwantari, who became physician to the gods, and who later taught this knowledge of the healing art to his pupils, Susruta and Charaka, surgeon and physician respectively. These last two interest us directly because their legendary is interwoven closely with that relating to the origin of the Ayur-Veda, a medical work whose age has been placed at from nine to sixteen centuries before Christ. Neither Susruta nor Charaka had the prejudices common among the Hindus (high caste) of touching the dead body, and the illustrations in their works

show that they must have dissected freely. To any student of medicine, who thinks that all knowledge and wisdom in the science and in the art of medicine are due to modernity, the reading and the study of this most ancient medical work, whose authorship is now ascribed generally to Brahma, will be found most illumining.

From the foregoing, two facts should be noted, namely, that medicine was *acquired* by Chiron in his botany excursions, and was *revealed* by Brahma to Dhanwantari, who in turn taught it to Susruta and Charaka. The influence of these two beliefs in the origin of medicine can be traced through history, and has given to medicine always that atmosphere of mystery from which the laity of our day have not emerged wholly.

The Greeks soon became greatly saturated with Hindu philosophy, and its influence predominates in their medical doctrines and from these to other times. Pythagoras (570–504 B.C.) established in the South of Italy the Doric and the Italian school of medicine, and two of his pupils, Heraclitus and Herodicus, were the teachers of Hippocrates (460–361 B.C.). These schools originated the idea of critical days in certain affections, and were the first among the Greeks to investigate the structure and functions of the body. Hippocrates became a staunch disciple of the Pythagorean philosophy which was but the continuation of the teachings of the temple doctors. He did not originate the Greek or so-called scientific medicine, but was rather the most striking figure in what was destined to be a new era in medicine. There have been systems of so-called divine healing in all great civilizations, but none have ever reached that high state of development, both for beauty of conception and for grandeur in execution, which characterized the cult of the Son of Apollo. The many social cults in medicine to-day supposed to be the results of exaggerated imagination are but mild prototypes of those set forth in the *Plutus* of Aristophanes.

The Hippocratic age combined the imagination of the earlier age and the restless critical spirit of observation characteristic of the new era striving to break away from the traditions of the past. Speculation and theory gave way to rational deduction; rival centres of intellect precluded the possibility of stagnation, and a foundation for scientific medicine was thus laid. So well was this work done that its central figure has ever since been accorded the title, Father of Medicine.

Hippocrates did not establish any fixed system of medicine. He taught the value of accurate observation of actual phenomena and the method of rational deduction from observed facts rather than by speculation and theory. He set a high moral ideal for the physician in a code of ethics which has had few equals as a human document. It was due to the influence of the Hippocratic era that medicine under the Macedonian regime and at Alexandria reached that high plane which gave birth in anatomy and in physiology to so many accurate data. Gradually, yet effectually, the sophistry of the philosophers overrode the science of medicine and the doctrines of Hippocrates became blended with platonic philosophy. Then followed system after system in medicine,—the Dogmatists (B.C. 400), the Empirics (B.C. 286), the Methodists (B.C. 100), the Eclectics (B.C. 81), and finally the Peripatetics in which Plato's pupil Aristotle overthrew his master's deductive method and instituted therefor the inductive method. This was an age of great thinkers, of great intellectual attainments, but true to the lessons taught by history that it is the theorist who is most honored by his contemporaries and that real progress in science is made only by the man who uses his eyes, the observer who sees something and can tell it simply as he sees it, we are not surprised to learn that the practice of medicine in this period had fallen so low in the estimation of men that the Romans considered it beneath their dignity

to engage in a profession or art so given to commercialism. We might pause here and compare the conditions of to-day with those of early scientific medicine, and find in the comparison many points of similarity, warning us perhaps that history has a peculiar faculty of repeating itself. My theme urges me onward, so let us trace historically the passing on of the torch which has ever burned before the shrine of medicine.

With the spiritual redemption of mankind came a great reformation in medicine. Galen was now the central figure. In every department of medicine the influence of this wonderful man was evident. He opposed the Methodists and the Empirics and added to the foundation of medicine anatomy and physiology; he was a great experimenter and aided thereby clinical medicine. His deductions from the dissections of apes and other animals led him into error often when these were applied to the construction of the human body; nevertheless, he re-taught the methods of Hippocrates in observation and accurate description, and so great was the reaction that Galen became an infallible authority, and for more than thirteen hundred years one whose word was law. This blind submission to medical dogma was the greatest factor in checking progress in medicine. It required the Renaissance for its overthrow. In the whole history of medicine there is not another such example of the complete prostration of the understanding where facts were clearly obtruding themselves upon observation, yet were allowed to go unnoticed or totally disregarded. Throughout the middle ages the Byzantine School and the Arabian School strove to preserve and keep alive the early Greek medicine. A Celsus or an Avicenna rose up to recall medicine from its lethargy, but the blind homage to Galen prevailed until its complete overthrow by Paracelsus in the sixteenth century.

Medicine reached modern Europe by means of the Uni-

versity of Salernum in Southern Italy, and later into France where dissections of human bodies which had been prohibited or abandoned on account of religious rites among the Greeks, Egyptians, and Arabians was resumed. The brilliant sixteenth century discoveries by Vesalius, Eustachius, Fallopius and others of the Italian School made possible the next great figures in medical ancestry,—Harvey, Paré, and Linacre. At Padua, Servitus and Harvey, under the same teacher, Fabricius, contrasted greatly in their investigations with the aimless course pursued at the other European schools. Although here and there physicians so excelled their contemporaries that they were called "The English Hippocrates," or "The Dutch Hippocrates," yet so philosophical were their medical writings, and so absorbed were they in substituting theology for medicine, that no genuine progress resulted until Morgagni in Italy and John Hunter in England united the phenomena of clinical observation with the study of morbid anatomy as found in the autopsy room. Surgery too was now raised from a mechanical art to an advanced science.

If we trace historically the offerings of science and of inventions during the eighteenth and nineteenth centuries, medicine will suffer nothing in the comparison; if we try to estimate the benefits accruing from the investigations of a Virchow, a Bichat, a Morton, a Pasteur, a Lister, a Koch, or a Theobald Smith, we can claim without fear of contradiction that mankind can never repay the debt. This brings us to a striking paradox. It is now admitted generally that the century just closed has witnessed discoveries in medicine that have added more to the general welfare of mankind, as measured by relief from suffering and disease, than the aggregate of all discoveries and inventions since the origin of man; on the other hand, we are forced to the conclusion that the physician of to-day does not occupy in the family, nor in the public mind, the same position of confidence, of

prestige, and of authority in health problems as formerly. How much of this is part of the wave of revolt against tradition and authority in all branches of human activity,—in religion, in political government, in art, and in the sciences? How much of it is due to the fact that while the physician has been striving to increase his knowledge of supposed physical causes of man's sufferings, and while he has been laboring for the eradication of disease, he has lost sight of the *patient*, the whole indivisible human being? Discovery has followed discovery so rapidly that the physician and the layman have become impatient, restless, and well nigh impetuous in seeking progress. So much has been accomplished in medicine that we have come into the state of believing that all disease must yield to science. The laboratory spirit and the practice of specialization in medicine have combined in giving false estimate of the posibilities in medicine, an overzealousness often to detect disease itself. Having eliminated entirely from medicine all philosophical reasoning we confound sometimes generalizations with the facts themselves and thus we fall often into error. New theories without basis of proof are then accepted as modern science when as a matter of fact there is no science at all; half demonstrated hypotheses become the foundation of new schisms which have in their creed just enough truth to merit some recognition. If then in the light of the past and in the full possession of established facts to-day we state our position rightly, science cannot suffer from knowing the truth, medicine must regain its sanctity from such an illumining, the physician can re-establish his rightful sovereignty by no surer means and the public cannot but be healthier and more sane therefrom.

The entire outlook on the science of medicine has been revolutionized during the past thirty years. Heredity no longer sways the destiny of mankind; the chemical control of the wonderful co-ordinations of the activities of dif-

ferent parts of the body is now appreciated; the knowledge of infectious and zymotic diseases has given us a better understanding of immunity and has resulted in the vaccines, antitoxins, and curative sera; and finally, a most extraordinary change has taken place in the scope of therapeutics. All this has affected greatly the sanctity of medicine as well as the physician. It has emphasized the importance of laboratory science, aud has created a new standard among medical men. Nothing in the whole history of medicine has been a greater factor than the laboratory in stimulating medical thought, in the bettering of medical practice, and in the advancement of accurate diagnosis and treatment. Unfortunately, however, laboratory methods had come to be misunderstood as meaning something requiring a special room, a large equipment, a knowledge of languages and higher mathematics. These are valuable and most helpful, but they are not absolute essentials. The laboratory method, on account of its association with the more exact sciences, had been granted a rating for mathematical accuracy and for precision not enjoyed by observation, deduction or induction. The profession as well as the laity had come to believe that the laboratory diagnosis made by the various methods and instruments now known as laboratory tests was infallible and final, while the experience of countless, keen, accurate observers of clinical phenomena as seen at the bedside was disregarded and the employment of well tested extra-laboratory methods of diagnosis and of prognosis retained so little of their former prestige that their neglect and abandonment seemed imminent. A reaction is already evident. The general practitioner now recognizes that the number and the application of laboratory methods which are of real advantage to him in the diagnosis of disease is surprisingly small in comparison with the number and the application of laboratory methods used for research purposes by the scientific worker who is devoting his entire

time to this branch of science. With a good working knowledge of the methods employed in urine analyses, in the chemical analysis of stomach contents, in sputum examination, and in the simple blood examinations, the general practitioner is well equipped for his work. He should keep in mind always, however, that there is a class of scientists more expert to which may be referred all questions of doubt, as well as the more scientific problems in medicine and surgery. These two classes of scientists are distinct, and much genuine knowledge is possessed by the one which can never be helpful to the other. In the final testing of all discoveries, of all laboratory advances, it is the rank and file of the profession which translates into practice and makes effective the new knowledge gained. On the other hand, we must not forget that the laboratory has its limitations. Science has done much in revealing the mysteries of nature, but it should be remembered, however, that there are still mysteries in nature that science has not revealed and which science can never reveal. In a word, there is a whole universe which stretches out its limitless space beyond the range of human knowledge. Great and promising as the future of scientific medicine seems to-day, nevertheless, unaided and of its own resources it leaves unexplained the origin of vitality itself. Would that we as physicians could estimate rightly the mystery of life. We try often to isolate the particular organ in which the kingdom of life seems to have its seat, to state in terms of definiteness the length and range of its power, to guide its exuberance, to stimulate its flagging, yet we reach eventually the conclusion of all previous ages, namely, that there is in every human being a vitality, a source of energy, constant and as markedly individualistic as the imprint of one's finger creases, or the intonation of one's speech. Nor are the limitations of the laboratory less pronounced on the physical side of our nature. We are forced to acknowledge that there are hun-

dreds of little accommodations between the various parts and between the various organs that it is impossible to explain or to be sure about; that there are countless reactions that cannot have a cause assigned to them; that there are numberless conditions that either cannot be labeled at all, or may receive several interpretations; that the state which looks grave to-day as far as can be judged by all attainable knowledge, may be simple and harmless to-morrow; that the "doing well" of to-day may be a disaster before another dawn. In other words we must either accept or reject the conclusions expressed by the greatest scientists of all ages, and so tersely set forth recently by the late Lord Kelvin, "Do not imagine that by any hocus pocus of electricity and viscous fluids you can make a living cell. You must never think of the living men, and women, and children, as mere laboratory specimens, but as human beings." The great Pasteur expressed this truth beautifully thus: "The more I know the more clearly does my faith approach that of the Breton peasant. Could I but know it all, my faith would doubtless equal that of the Breton peasant woman."

Unfortunately, the humility of these great men has not characterized scientists always, and we find men building hypothesis upon hypothesis which were a check to the progress of medicine. In the Platonic period of medicine, for example, the Greeks chose to speculate rather than to investigate the meaning of phenomena, and the mysticism that resulted was evident for centuries. This had an evil influence on the practice of medicine, and gave the physician a false position in the estimation of the people. The sick man believed that the physician possessed powers almost supernatural, and the physician was forced to supply by fiction and pretense the appearance of possessing such knowledge. Here arose the judicial wig, the academic ruffle, the gold-headed cane, the reflected snuff box, and the Socratic air. To-day, the impatience to fulfil the expecta-

tions of the laity lies within the profession, and while protesting on one side against the acceptance of all phenomena not proven by the laboratory, on the other hand we are encouraging, unconsciously often, the belief among the laity that the absolute and exact knowledge of the nature of every disease is ascertainable and that an appropriate remedy for each exists. In other words, we are giving to medicine all the attributes of an exact science which it is impossible for medicine ever to attain. The truth of the matter is that the more we learn concerning the workings of the great internal laboratory, especially its relation to the action of the nervous system, the more we must realize that there are factors which do at times influence greatly the course of disease and which are neither measurable nor demonstrable by laboratory methods. These factors must be recognized, they must be stimulated, if we are to exercise rightly the fullness of medicine. Their appreciation by the physician is a check to the spread of infidelity and false skepticism in our ranks, their explanation, as much as they can be explained, will eradicate superstition among the laity; their acknowledgment will recover from the Eddyites and others of like belief the one grain of truth upon which has been built a mockery of Christianity and of science.

The over-emphasis of the importance of the influence of these factors, however, has given rise lately to a heresy no less grave than that resulting from the false view outlined above concerning the value of laboratory medicine. A new word, "psychotherapy," has been coined to express the method of treatment which in reality is a very old therapeutic measure. From the use of the word "psychic," as well as its association with religion, there is implied that the soul is the object of consideration, yet there is nothing in the condition of the patient or in the benefits accruing from this line of treatment which in any way affects the soul. The influence of the soul on the physical being, and vice

versa, is an axiom of psychology; nevertheless, psychotherapy as understood in this instance is dealing with conditions in the patient which have resulted from influences acting primarily on the physical person through the senses and secondarily through the imagination. It is in reality a physical result from an obsession of the imagination. Religion is not concerned in the problem at all. It is a physiological process pure and simple, and has a perfect analogy in the physical person. Just as in every person there is a margin of supply in all the tissues, and fluids, and organs of the body beyond which we seldom reach, and which makes a tolerably good state of health compatible with even a marked deviation from normal, so too, in the non-physical state of every individual, there is a rich storehouse of unsuspected resources, one which is full of new energy, awaiting but the spark of contact to manifest power and strength unknown to its possessor, even. Just as in the purely physical life, opsonins promise much in bringing into action those reinforcements which win the battle, so in this so-called psychic state a "phagocytosis" the nature of which has never yet been unraveled, results when the right opsonin is supplied, whether it be tar-water, Perkins Tractors, Christian Science, or Suggestion. This is what the physician from time immemorial has done, and the physician of to-day who looks upon his profession as a *vocation*, and acts accordingly, is fully ordained to stimulate the highest and best energy inherent in his patients. To admit anything else is to deny the very foundation of the sanctity of medicine and to destroy the corner stone upon which is erected both religion and medicine,—Faith. Before there was any science in medicine, at an age when medicine was philosophy, we find that same confidence, that unswerving belief of the patient in his physician which has come down unbroken through all ages. The advance of science and the experience of countless observers have com-

bined to give a better basis for such a belief in the practice of medicine. We appreciate fully these gifts of science, we acknowledge their limitations, and while we admit the necessity almost, as well as the value of that simple faith on the part of our patients, nevertheless, the practice of medicine is not medicine at all when that faith is based wholly upon the idea of mystery, or that the physician has supernatural power over disease. Neither the physician nor any other human being of himself has any such power. The association of religion and medicine has caused confusion. From time immemorial religion and medicine have each had its special field of labor. At all times medicine has received much strength from religion, and during many centuries its light must surely have failed had it not been for this protection; at times in early missionary work economy or exigency forced the union of theology and medicine, but there is no instance in all history where one has been substituted for the other that both did not suffer thereby. Medicine needs religion greatly, and the physician who does not allow it to have its legitimate moral and humane influence on his life,—scientific as well as professional and lay,—soon loses the sanctity of medicine, and substitutes a trade for a vocation. True religion, on the other hand, does not need medicine to complete its purpose, for it is perfection itself. When we come to miracles performed in the name of religion, by religion, and through religion, we pass from the works ascribed to the power of man to those capable of being performed by God only. The physician or person who claims for himself or his profession any such supernatural power blasphemes religion and the sanctity of medicine. Scientific medicine has no conflict with true religion, and all attempts to estrange the two should find a ready foe from the ranks of medicine. It is not helping medical science to claim that cures are not possible because we cannot demonstrate the process, neither does it lower

the dignity of the profession to acknowledge that there is a power higher than the science of medicine. When, however, men seek advice and relief on questions of physical ills from those not engaged in the practice of medicine, it is because our medical schools have failed to impress upon the minds of their students the full breadth of the vocation of the physician. They have left untouched the development of that subtleness, that comprehensiveness, that appreciation of the non-physical in man, which gives to the art of medicine the sacredness of a science. In other words, the student has been trained for pure materialism only. Any attempt to make psychotherapeutics, as defined to-day, other than a part of general medicine must be regretted, and is not devoid of danger. It is a legitimate part of the art of medicine. The physical and the non-physical are so interwoven that no illness can ever be said to be due entirely to the one or to the other. The recognition of this fact was the basis of one of the most ancient as well as the most sacred of the physician's vocational duties. There can be no division on this subject in the practice of medicine. It calls for the physician who sees and who can appreciate the whole patient. It reposes upon the specialist the necessity of recognizing that, while division is advantageous to the science and to the art of medicine, nevertheless there is a limitation beyond which this division fails to secure its best results. That there is legitimate field for true psychiatry is well established and must not be confounded with the exercise of those duties resting upon each physician and surgeon in his daily vocation.

To meet these requirements calls for the rehabilitation of the family physician of the old school, not as a general practitioner, but as the advisor and the guide to the individual and to the family in all problems of health, and in the choice of a specialist, as well as to groups of individuals in their duty towards the state. This means that certain

traditions and prejudices long existing in the practice of medicine must be altered. The physician can no longer confine himself to relationships with individual patients. He must take a position of leadership in public questions of health and morals. Society at large needs the idealism of the true physician, the example of his humble submission to authority, his uncompromising spirit of truth, his self-sacrificing devotion to the social good. Quackery and charlatanism will continue to be the accepted belief of the public until the educated physician puts within the reach of all the truth on questions of disease and cures.

There is no more powerful factor in furthering preventive medicine than by the popularization of medical knowledge. Observe that I do not advocate popularization of specific lines of treatment, but rather the wisdom, the necessity for the physician entering actively into the broader fields of public health problems. We have seen what may be accomplished against tuberculosis; we have witnessed the eagerness with which the public sought knowledge from the best sources as illustrated at the free course of lectures at the Harvard Medical School during the past two years. There are almost limitless problems awaiting solution in public health, in school, in home, and in workshop hygiene, in the care of the teeth, skin, and sense organs, in the relationship of diet and exercise to health, in the evils of overcrowding in tenements, in the influence of modern life and modern industrial developments, in the life of the child, in the various social, economic and political questions involved in our social progress. Boards of Health will remain inefficient, public schools will construct programmes without regard to the physical welfare of the child, insane and public hospital institutions will fail to give their patients the advantage of modern progress, legislators will continue to disregard advances in preventive medicine just so long as the physician looks upon the practice of medicine as a means

to administer drugs only. When we convince the public that the real value of medicine lies in the *advice* given by the physician to the individual and to the community we will hear less of the unreliableness of expert medical testimony and low fees in practice. Nothing in this public field of activity necessitates that the physician shall become the political doctor; on the contrary, there is no more effective check on those who would make the dignity and sanctity of medicine subservient to their personal ambitions and gains.

Medical things and the medical view and relation of affairs are as much the property of the public and subject to its review as in any other department of life. Quackery and charlatanism gain a foothold by a peculiar publicity and the positiveness of their claims. While preserving standards the profession must welcome the fullest inspection of its knowledge, institutions and departments.

To meet this conception of future medicine, medical schools must provide facilities for the broader application of their teachings. Their students must be equipped with the knowledge necessary to accept the responsibilities the public now believe should be reposed in the medical profession. The practitioner of the future must be not only highly educated as his college requirements to-day necessitate, but he must be so trained to give to the public the benefits of the choicest of the laboratory gifts, the wisest o the philosophy of our ancestors in medicine, and the consolation and strength of that faith engendered in each patient by his own firm conviction that man is God's highest and best work, and that his best service is found in the sanctity of medicine.

"There is nothing in which men so approach the gods as when they give health to other men." (Cicero).

ARTICLE II.

THE SHATTUCK LECTURE.

SOME ASPECTS OF GONORRHŒA.

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SOME ASPECTS OF GONORRHŒA.

THE history of gonorrhœa is written in the earliest records of man; especially do we find definite statements in the Bible, in Leviticus, Chapter XV. This chapter refers to the prophylaxis of a "running issue out of the flesh," and upon the definition of an issue depends our reading of that part of the chapter which is devoted to this subject. The second verse of Leviticus, Chapter XV, is referred to in the Century Dictionary as illustrating its definition, "a vent for the passage of blood or morbid matter, a running sore, accidental or made as a counter-irritant." In the Latin Vulgate of St. Jerome the running issue of the flesh is translated as *fluxum seminis*. As part of this chapter is looked upon by specialists as referring to gonorrhœa, and as I know nothing of the original text, I consulted an authority in Hebrew with regard to it. Professor Gotthard Deutsch, of the Hebrew Union College and editor of the Jewish Encyclopædia, explained the whole situation as follows. The original employs the word Zab, which means a discharge and has always been accepted as referring to gonorrhœa: it cannot refer to a discharge of semen, in that in Leviticus Chapter XV, verse 16, the word Zera which means sperma is employed. And furthermore, the first fifteen verses of Leviticus XV show conclusively that an infective discharge from the genitals was referred to as an issue.

However positive we may be in the male, as to the meaning of a running issue, this is not the case in the female, the word Zaba, a female afflicted with a running issue, being used in a context which makes it impossible to be absolutely sure; yet a philological view would also cause one to believe

that gonorrhœa is meant. The translation of St. Jerome was completed in 405 A.D., it was finally done directly from the Hebrew text, but his definition of issue may be ascribed to two reasons, either, as is even done to-day, a flow from the penis was looked upon as a seminal discharge, or as is even more probable, Jerome had in view the Greek term γονόρροια (from γόνος a seed and ῥέω). Although this term was first introduced by Galen in the second century it was probably known to Jerome.

As to the cause of gonorrhœa the authors before the fifteenth century believed it to be impure semen, increased and pathogenic secretion coming from ulcers of the urethra, or from disease in the bladder or kidneys. In the fifteenth century an epidemic of syphilis spread from France over the whole of Europe; a most remarkable account of an attack of the disease is given by Benvenuto Cellini in his wonderful Autobiography, in the beginning of the sixteenth century. At the same time, in Drei Bücher von den Franzosen, 1529, Paracelsus expresses an opinion as to the etiology of the Franzosen (Morbus Gallicus) which held good until the eighteenth century. "Biss auff den Ursprung der Franzosen ist auch beschehen, das zu beiden Seiten vil Frawen und Mann einander Krankheiten zu gefügt haben, und doch nicht Blatterische art. Das mag nit widerredt werden, anders dann dass die Frantzosen eine vermischte Krankheit ist von allen zusammen, gesetzt" (Haeser). (It has also occurred before the coming of the French disease that, on both sides, many women and men have produced sicknesses in each other, and yet not of a pustular nature. This cannot be explained, except in that the French disease is a mixed disease composed of all the others combined.) In 1767 Francis Balfour of Edinburgh in his Dissertatio de gonorrhœa venerea, first showed that gonorrhœa and syphilis are due to two distinct poisons. This view, which was accepted by Morgagni and others, would have prevailed

had it not been opposed by John Hunter, so that the profession was divided into two camps, one believing in the identity, the other in the non-identity, of the two poisons. The subject was settled definitively by Ricord in 1831, who by means of a large number of inoculations in human beings, conclusively established the fact that gonorrhœa never produces chancre, as well as the converse of this, so that opposition to the dual view of the two poisons gradually ceased. But from Ricord to Neisser (1879) the medical world was divided as to the specificity or non-specificity of the gonorrhœal virus. During this time, and for some time afterwards, an attack of gonorrhœa was looked upon as of the same importance as a bad cold. With the discovery of the bacterial cause came a new era, as it has come to us in all the acute infectious diseases. A definite cause being known, gonorrhœa came to be absolutely recognized so that diagnosis, treatment and our general knowledge of the disease were placed upon a more definite basis. With this also came, as is natural and common in all new discoveries, statements which did not agree with the common experience of practitioners. Moreover, in various countries of the world there is an organized movement to promote sexual purity in the male. In common with all anti-movements when applied to medicine, many exaggerated statements have been made, at least statements which will bear careful investigation. I refer to the frequency of the disease, some of its complications, but especially its sequelæ. These will form the subject of our discussion.

An examination of morbidity in large numbers of men will give us somewhat of an insight as to the frequency of gonorrhœa. For this purpose, statistics derived from regular armies, in which the men are under medical surveillance, seem to be most suitable. Statistics are available for nearly all European armies and have been collected and tabulated by Dr. Heinrich Schweining. For the figures in our own

army I am indebted to the Surgeon General Dr. R. W. Reilly, for those of our navy to Surgeon General R. S. Rixey. For those of Schweining that will be quoted, the number of years included is five; for our army ten, and for our navy seven.

In a tabulated form they are as follows:

TABLE I.

MORBIDITY.

Prussian Army	1.23%
Bavarian "	1.39%
Austrian "	3.02%
French "	1.81%
Italian "	4.6 %
British "	5.94%
U. S. "	8.95%
U. S. Navy	3.88%

From this table it will be seen that the morbidity varies from 1.23% to 8.95%. That the English-speaking armies stand highest in the list is rather a surprising result. An explanation for this may be sought in the difference of personel that exists between English-speaking soldiers and those of other countries, especially in respect to authoritative control, but also in other reasons which will be mentioned hereafter. That in the navy the number should be less than one half of that in the army is easily understood, as in the navy the chance of infection is less and, possibly, the men are under stricter surveillance than in the army.

For civil life statistics have been collected by Blaschko as follows:

TABLE II.

Copenhagen	1876–1895	12.8%
Students of Agricultural and Veterinary schools, Berlin (600)	1891–1892	18.5%
Mercantile Sick Associations	1893–1897	
Hamburg		10.3%
Berlin		12. %
Breslau		20. %
For thirty large and small cities . .		12.3% (average)

This table, when compared with Table I, shows that, in civil life, gonorrhœal morbidity is higher than in the army or navy. Furthermore that, as in all acute infectious diseases, morbidity differs, for various reasons, in different places. Thus for merchants, Hamburg has only one half the morbidity that is found in Breslau. When all occupations in all localities in Germany are examined, *i. e.*, as far as this has been done, the following results are obtained. Next to soldiers, the lowest morbidity is found in workmen, the highest in the middle classes, merchants, students, officers, professional men; the "upper ten thousand," on the other hand, are least affected "on account of the exclusiveness of their sexual relations." (Blaschko.) In this country, merchants, students, professional men, would be ranked among the higher classes, but the relation of morbidity is the same as in Germany, even when "the upper ten thousand" are considered. In speaking of the relations of morbidity, I exclude our soldiers altogether for reasons which will appear presently. The reasons why morbidity is so low in the working classes are many, principally in that the working classes, when single, have neither leisure nor means to indulge their sexual appetites and, possibly, in that hard physical labor reduces sexual desires.

It has been so often stated that venereal diseases are on the increase that it has seemed necessary to look into this question. For men, we again have the statistics of armies, which give us the morbidity of large numbers, year by year. They are not only important as to the morbidity of these men, but also as to the relative morbidity of the communities in which these men live, therefore as to general morbidity, year by year. All the armies of Europe show a decrease in the frequency of gonorrhœa, although, as in all other infectious diseases, and for unaccountable reasons, some years will be found which are exceptions to the general rule. For civil life the Copenhagen statistics show a

morbidity of 13.8% in 1886, and 10% in 1895, in men between 20 and 30 years of age. Table III. shows plainly to what extent this diminution in morbidity has taken place.

TABLE III.

Armies.	Time.	Total Decrease.	Average Annual Decrease.
Prussian Army	1881–82 to 1900–01	56.6%	2.8%
Bavarian "	1881–82 to 1902–03	59.9%	2.7%
French "	1880 to 1902	56.6%	2.5%
Belgian "	1880 to 1903	59.4%	2.5%
Italian "	1881 to 1901	29.1%	1.4%
Austrian "	1879 to 1902	29.2%	1.2%

This table, also taken from Schweining, is very instructive, because it shows the German armies, the French and the Belgian on about the same plane in the reduction of morbidity, while in the Italian and Austrian armies the figures are much lower. In the English army, as well, there has been a reduction in incidence of the disease, which is not brought out in the table as the figures did not lend themselves to comparisons. For the continental armies the steady decrease is ascribed to prophylactic measures, the statement being made that in proportion to the strictness in prophylaxis the greater the reduction in morbidity.

As our army forms a most extraordinary exception as to constant reduction in morbidity, it is well worth our while to study the conditions.

It will be seen that, with slight interruptions, there has been an increase in morbidity since 1898, reaching a maximum of 13.1% in 1905, *i. e.*, one soldier in 7.61 or 7471 cases of gonorrhœa in one year. The table also shows that in ten years 70,899 soldiers had had attacks of gonorrhœa. This enormous number of cases certainly demands investigation as to its cause, as there is no doubt that so many

TABLE IV.

Years.	Mean Strength.	Number.	Cases.	
			%	Ratio.
1897	25417	1440	5.6	17.65
1898	147795	7683	5.1	19.24
1899	105546	8468	8.0	12.46
1900	100389	7899	7.8	12.71
1901	92491	8685	9.3	10.65
1902	80778	8609	10.6	9.38
1903	67643	6503	9.6	10.40
1904	58740	7106	12.0	8.27
1905	56901	7471	13.1	7.61
1906	56443	7035	12.4	8.2
Total,	792143	70899	8.9	11.17

cases of infection seriously affect the efficiency of the army, —in peace, in the direction of its development; in war, in the performance of its duties. Moreover, the sequelæ incident to gonorrhœa in so many is a matter of serious importance to the state, disregarding the soldier and only considering the citizen.

If we look at the following table, showing admissions for gonorrhœa and alcoholism, kindly compiled by Dr. Walter W. McCaw, Major, Medical Corps, U. S. Army, some light is thrown on this subject. It includes the regular and volunteer army, with ratio per thousand of mean strength, by years. Scouts and Porto Rican Provisional Regiments are not taken into consideration. In the years marked with a cross, officers are also included.

The table should be studied in the light of the fact that the sale of beer and light wines was forbidden in the canteen in February, 1901. While the ratio of gonorrhœa to 1000 men was going up almost uninterruptedly from 1895 to 1900, the average yearly ratio was 62.07. The ratio still going up, the average annual ratio per thousand, from

TABLE V.

Gonorrhœa.			*Alcoholism.*		
YEARS.	NUMBER.	RATIO.	YEARS.	NUMBER.	RATIO.
1895	1278	50.71	1895	759	30.11
1896	1361	54.18	1896	730	29.06
1897	1440	56.65	1897	708	27.86
X 1898	7638	51.99	X 1898	1279	8.65
X 1899	8468	80.23	X 1899	1529	14.49
X 1900	7899	78.69	X 1900	1540	15.34
X 1901	8685	63.90	X 1901	2018	21.82
X 1902	8609	106.58	X 1902	1830	22.65
X 1903	6503	96.14	X 1903	1670	24.69
1904	7166	120.97	1904	1622	27.61
1905	7471	131.30	1905	1687	29.65
1906	7035	124.65	1906	1762	31.22

1901 to 1906 inclusive, was 112.26 (an increase of 87%). An analysis of the alcohol morbibity on the same lines shows that in the first six years, before abolition of beer and wines, the average yearly ratio was 20.92; in the second six years, 26.27, representing an increase of 25%+. If we permit this increase in alcoholism to account for the same increase in gonorrhœa, there remains an increase of 62% gonorrhœa which must be explained in a different manner. It seems clear to me that, having taken away the attractiveness of the canteen, and I employ this term in a general way not especially referring to beer and light wines, the soldier leaves the barracks more frequently and finds more dangerous attractions. Whatever may be said for or against the canteen, and it seems that a canteen without beer or light wines does not fulfil the functions of a perfect canteen, gonorrhœa has increased 45% and alcoholism 20% since the canteen has been modified. But the changes in the canteen alone do not explain this enormous increase in gonorrhœa, as we also see an increase in gonorrhœa in the navy, where there is no canteen. A glance at the following table shows the exact increase.

TABLE VI.

United States Navy.

Years.	Mean Strength.	Number.	Cases.	
			%	1 in every X men.
1900	22977	525	2.29	43.76
1901	26101	617	2.36	42.30
1902	30249	771	2.55	39.10
1903	36535	1032	2.82	35.40
1904	39450	1512	3.83	26.10
1905	39620	2085	5.26	19.00
1906	41690	2640	6.33	15.80
Totals,	236622	9182	3.88	25.77

From 1900 to 1906 the percentage of cases has gone up from 2.29% to 6.33%, and the ratio of one to every X number of men (mean strength) has changed from 43.76 to 15.80. Of the 246,622 men in the navy, 9,182 have had gonorrhœa. While this number is sufficiently great it dwindles into insignificance as compared with that of the army, but it shows us that the canteen cannot be held responsible for the whole trouble.

There is no doubt that the situation calls for rigorous prophylactic measures; that gonorrhœa can be reduced to a minimum in large bodies of men under control has been shown; that the same prophylactic measures, modified for the personel of our army and navy, will do the same for us, cannot be denied.

In regard to morbidity in women, the statements differ as widely as with men. The kind of material utilized seems to determine the frequency of gonorrhœa in the female as much as anything else. Thus in gynecological practice Bröse saw 45 in 302 = 14.5% when patients in private practice only were considered; in all his cases that came for treatment, 898, 176 = 26.6% had gonorrhœa. Sänger saw 29 in 161 = 8%, and Eberhard, both in private practice,

20% gonorrhœa. It seems reasonable to conclude that these figures are too high when applied to all females, because gynecologists only see patients who suffer from genito-urinary diseases and no others, therefore these figures represent the percentage of gonorrhœa in women affected with genito-urinary diseases which are seen by gynecologists. The differing results are best illustrated by figures from the Massachusetts General Hospital; in the first six months of 1906, 1027 women were admitted; of these, 39 had gonorrhœa = 3.8% ; in the out-door department 6637 women were examined; of these, 111 had gonorrhœa or its sequelæ = 1.6% + ; or more than three times as many in indoor as in dispensary patients. In Erb's statistics 6.25% had gonorrhœa, making the most liberal allowance possible in accepting manifestations as being gonorrhœal. Whichever of these latter figures may be accepted, they again show how much exaggeration has been indulged in, in estimating the frequency and dangers of gonorrhœa.

The statements as to morbidity represent only those males or females who have gonorrhœa at a given time, therefore not the number who have had gonorrhœa during their life-time. In order to determine how many men have had gonorrhœa (and it is the man who is now accused of doing all the harm), it is necessary to find some other way. As gonococcus infection does not produce permanent immunity and as individual immunity is a minimum quantity, if it exists at all, it will be seen that the figures just presented will give us very little insight into this question. It was Ricord who first made the definite statement that 80% of men have had gonorrhœa, a statement that has been and is still being quoted and accepted all over the world. If this figure is correct, it follows, as the result of modern scientific investigation, that the possibility of harm done by gonorrhœa, both to the males and to their wives and children, may be very great.

In the last five years this question has been taken up, especially by the Germans, with results so varying that further evidence is necessary to answer it.

In 1902, A. Blaschko of Berlin published a paper which was based upon the following facts and computations. The Prussian Government asked that on the 30th day of April, 1902, all physicians of Berlin should examine their patients as to the presence of gonorrhœa. There followed a report from 52% of all the physicians, who had examined 10,000 patients and found 83 having gonorrhœa. Blaschko, in taking up this report, makes corrections, based upon other statistics, moreover, considers the fact that many cases of gonorrhœa are not seen by licensed physicians, and finally computes that the number should be 240 instead of 83. By the further employment of mathematics, the data being, a one day inquiry of 52% of all the physicians of Berlin, a report in 10,000 cases, finding of 83 cases of gonorrhœa in these (raised to 240) and the consideration of other statistics, the following conclusions are drawn: 1. The number of cases of gonorrhœa occurring in one year is 1920. 2. Out of 1000 men between 20 and 30 years of age, nearly 20% have gonorrhœa every year. 3. If a man, older than twenty years, remains unmarried for five years, he will have gonorrhœa once; if unmarried for ten years, twice. 4. All men who marry after thirty years of age will have had gonorrhœa twice. Gruber, who takes his statistical methods from Blaschko, the latter defending these in a later publication, states that 25% of all students in Berlin have gonorrhœa in one year, therefore every student will have had gonorrhœa once in four years.

Here are specimens of computations, taken from morbidity alone, which in the nature of things must be incorrect. After all the students have had gonorrhœa in four years, and they get second attacks, the percentage of gonorrhœa in the male is put down as high as 150 or 200% by

these observers. Whatever may be the statistical method of expression, only 100% of male human beings can have gonorrhœa. Moreover, it is a well recognized fact that all human beings do not have gonorrhœa, so that if this statistical research is worth anything at all it expresses, in figures, only the chances that exist for an individual to acquire the disease.

In 1904, no less a medical personage than Erb of Heidelberg took up the investigation of the frequency of gonorrhœa in men, and has now contributed to our knowledge of the subject in three articles (1906 and 1907). In his first paper he refers to 600 individuals, aged 25 years and over, 43.3% of whom only had had gonorrhœa. In his second paper, his material has grown to 2000 individuals, of whom 48.5% have had gonorrhœa. He has taken all patients who have consulted him and inquired into their antecedent history, instituting what he calls a retrospective method. He does not claim more for his statistics than is presented, and asks for confirmation or refutation. So far, Bettman has reported 240 individuals, examined in a dermatological clinic, between 20 and 30 years of age, the gonorrhœal incidence being 41%; and Yudice, with the same kind of material, finds it 50.3%.

In order to find what percentage there is in Cincinnati, I have subjected my own male patients to a strict examination as to their gonorrhœal history. My material is somewhat peculiar because in the greater number of cases the individuals have been under my care for twenty-five years or more, at a time then, when gonorrhœal morbidity is greatest in them. Furthermore, no individual under 30 years of age was recorded; this was done because about 95% of all cases of gonorrhœa occur between the ages of 16 and 30. In 258 individuals 54.1% had had gonorrhœa, 45.9% had not. The occupations were as follows: 176 merchants and bankers, 14 salesmen, 38 professional men,

8 musicians, 10 farmers, the remainder artisans. Upon the whole this is corroborative of Erb's statistics, 54.1% to 48.5% my collection offering about 5% more than Erb's. In the Massachusetts General Hospital, East Service, out of 349 male patients (year 1906–1907) only 77 *i. e.* 20%, had had gonorrhœa (F. C. Shattuck), again demonstrating the lower percentage in the so-called lower classes.

As will be readily understood, these retrospective statistics were assailed by many, principally on two grounds; that individuals forget attacks of gonorrhœa, and that they prevaricate. It is possible that a few may forget an abortive attack, but a well developed case of gonorrhœa is not forgotten as it entails too much suffering. In addition, when it is not taken in hand properly, frequently when it is, sequelæ develop which impress themselves upon the patient's memory with increased force; at least such has been the case in most of my patients. That patients do not tell the truth as to gonorrhœal attacks has not been my experience. There is no reason why they should not tell the truth; they have had a disease comparable in importance with a bad cold, which could not permanently damage either themselves or their offspring—at least such has been the teaching before the advent of the gonococcus. In syphilis it is different; this is a disease which the layman knows to be transmissible and which may do great harm to the individual and his offspring. As a result, and I cannot agree with Erb here, the statements regarding the previous history of syphilis are unreliable. When the time comes that laymen are taught the dangers of gonorrhœa as is done by Janet, who says that "the social importance of gonorrhœa is to that of syphilis as 100 to one, not only because of the number of persons attacked, but also on account of the gravity and perpetuity of the lesions," a retrospective view of an attack of gonorrhœa will be less pleasant and the individual will sink in his own estimation; both incentives for forgetting or not remembering.

The question of sterility in relation to gonorrhœa is one that has called out a great variety of expressions of opinion, many of which are merely surmises. It will be interesting to note here that Rabbi Johanan, who is supposed to have lived in the third century, calls attention in the Talmud to the relation of gonorrhœa and sterility in the female. He gives ten different directions for curing this sterility. The first one is as follows: "Take the weight of one denarius of Alexandrian gum, and the weight of one denarius of alum (or aloes) and one denarius weight of fine crocus, and mix them in three times the quantity of wine and give to the woman afflicted with issue (Zabah) and she will not be sterile. If you put the same ingredients in twice the quantity of brandy (made from dates) it will heal jaundice but will leave the patient impotent." I have looked through the remaining nine prescriptions, which are more or less fantastic, and can find nothing which would affect gonorrhoea; indeed all of these have to be given to the patient and then followed by the words "arise from thy blood issue." As there are so many prescriptions, and most of them require a long time to prepare and to take, I am afraid Rabbi Johanan was not very successful in his treatment.

Noeggerath, who first invented latent gonorrhœa in 1876, stated that in every 1000 men, 800 had had gonorrhœa, which was followed by infection of their wives in a great majority of instances. He also believes, as does Fürbringer, that after a gonorrhœal inflammation the testicle no longer produces spermatozoa, which has been completely disproven, as Benzler has shown for the German army that, even after bi-lateral epidiydmitis only 41.7% childless marriages resulted. Noeggerath claims that 50% of all sterility is due to gonorrhœa, Neisser 40%, Flemming 80%. Doctor states that every father who gives his daughter in marriage must be prepared to have her infected with gonorrhœa with all its sequelæ. Lawson Tait caps the climax by stating that

after a man has once had gonorrhœa he should not be allowed to marry.

It has seemed to me that the only way to arrive at any conclusion, approximately correct, in regard to the percentage of sterility, must come from the observation of married couples in which the male, the female or both have had gonorrhœa. This has been done by Schenck, by Seligman and by Erb, with the result that these found the following percentages of sterility due to gonorrhœa: 23.7; 8.5; and nearly 12.

In the Massachusetts General Hospital, of 161 married men with sufficiently adequate family histories, 35 admitted venereal disease; 21% were sterile marriages. As seven of these had had syphilis as well, this percentage is probably too great when applied to gonorrhœa alone. It is noteworthy that the number of children per man was 2½ plus, somewhat larger than the average in a married couple at the present day. These statistics are very valuable, as they show the same percentage of sterility in the total number, as in those affected with venereal disease, therefore giving a little higher percentage of sterility, 23% in those not affected by venereal disease. Even in prostitutes sterility is not so common as is accepted by all of us. Laser in Breslau found that in 44 prostitutes, all infected with gonorrhœa, 24 had had children, *i. e.* 55%; eleven had borne one child; five, two; four, three; two, five; one, six; and one, seven.

Erb's statistics were collected in the following way: he had general practitioners make a collection of 400 married couples of which the men had had gonorrhœa, the wives being examined. 375 women were well (93.75%), 17 (4.25%) had gonorrhœa, possibly 8 (2%) more. In 88 there were no children, 44 (not quite 12%) in which no other cause except gonorrhœa was found, in 40 there were other causes, and in 4 there was prevention of conception.

He states, however, that sufficient attention was not given to this last cause. Even Blaschko admits that these results are fairly reliable.

In trying to arrive at a conclusion I have followed a different course. I have taken three generations, the histories of which were all known to me, whom I have attended, in all kinds of illnesses; some of the second and many more in the third generation I have assisted into the world. In the first generation I had to select my material as, for manifest reasons, childless couples were of no service for the present purpose. Furthermore, it was necessary that all these married couples lived beyond the period of fecundity, otherwise the second generation would not give results that could be utilized. Widows and widowers were excluded, as the number of children might not be sufficiently correct. For these reasons the number of married couples which would serve our purpose is necessarily a small one, 42. Of these 84 people 19 are alive, 6 men and 13 women; the youngest being 70, the oldest 94 years of age. In the second generation, the youngest is 35 years and the oldest 66 years of age. But childbearing in this generation is over, as will be seen hereafter; if any more children come the general result will be but little affected, at all events they will be principally accidental accretions. A possible source of error may be found in that 16.8% are unmarried, but this will also be very small. In the third generation the youngest is two years and the oldest thirty-one years of age.

In the first generation the forty-two couples had 226 children *i. e.* 5.3 children to each couple, of which 17.2% died. Of the 226 children, 150 married and had 331 children, *i. e.* 2.2 children for each married couple—a reduction of more than fifty per cent. It will immediately be seen how grotesque the explanation for this reduction in birth rate would be, if we put it on an exclusively gonorrhœal basis.

If this were done, the gonorrhœal incidence in the first generation being the same as in the second, there would be no reduction in the birth rate; if it were less, the birth rate would be greater; if greater, it would have to be one hundred per cent. to equal the reduction. In the 150 married couples of the second generation, 11 are sterile (7.3%). Only nine of these can be considered, in that two women were married after the menopause had set in; in addition, in three married couples at least there was a sufficient explanation aside from the gonorrhœa of the male. In the six that are left, five men had had gonorrhœa, one had escaped; so that there are left five married sterile couples in which there was gonorrhœa in the male; in one of these there is fear of some hereditary disease in the children, so that precautions are taken not to have children. There are finally left four couples in whom sterility may be ascribed to gonorrhœa in the male—but as far as this history goes, no evidence of gonorrhœa has been found in the female. If gonorrhœa produced sterility in these four cases the relation of cause and effect being proven, it would show that in 22.5% of sterility, gonorrhœa is the cause. As, however, no gonorrhœa has been found and the number of cases is very small, continued investigation is required.

It is not the question of absolute sterility, however, which is now considered as of sole importance in gonorrhœa, but that form of sterility which has been called "one child sterility." Indeed, some have gone so far as to state that one child sterility is par excellence the form which follows gonorrhœal infection of the female, as it is especially after confinement that the gonococcus is found in the uterine cavity, multiplying very rapidly in the lochia according to Bumm and to Steinbüchel, producing metritis, salpingitis, oophoritis, perimetritis and other lesions. The only statistical researches are by Schenk, to whom I believe we are indebted for the remarkable term "one child sterility," who says

that this is due to infection of the tubes during pregnancy in 43% of all instances. Erb has also investigated this subject and found one child sterility in 74 married couples out of 370 (21%). In 13 of these he found prevention of conception, and he admits that this part of the research is not sufficiently accurate; in 44 no cause was found.

If we now turn to my own statistics of the three generations, we find that among the 150 married couples, with 331 children, there are 39 in which the outcome was one child; if we deduct five widows and three widowers, there are left 31 married couples in whom the question of one child marriages may be investigated. It gives us first, the astonishing figure that in 142 married couples there was one child in 28% plus, 7% more than Erb. Secondly, in the 31 cases of one child matrimony, there was prevention of conception in 24 married couples, none in only six, one case could not be examined into at all. 18 of the men had had gonorrhœa, and in five there was no prevention of conception. In these five the wives were normal in two instances, in one case there was pulmonary tuberculosis, in the other two there was a metritis and a salpingitis, so that out of the 18 cases which could have contracted gonorrhœa from their husbands there were only two who presented any evidence of illness of the genito-urinary apparatus. It has not been positively proven that these two cases are due to gonorrhœal infection, but accepting this to be the case it will be seen that the cause for "one child sterility" can be ascribed to gonorrhœa only in about 11% of all the cases of sterility. Unfortunately, in going into this research I neglected to inquire in all the cases, into the number of abortions which occurred after the one child was born, but in this series of cases there were five at least.

In 12 one child marriages a gonorrhœal history was altogether absent; in all of them, as far as I inquired, there were three miscarriages. Three children represented fail-

ures in preventing conception. In all except two, further conceptions were prevented; in these two, one had passed the menopause, and the other had a misplaced uterus. In this small series only two did not prevent conception, so that in the whole series of 31 cases only six instances of one child matrimony which could not be explained in this manner. It is true that two had evidences of gonorrhœa, and it is possible that more had had the disease, the evidences of which had disappeared. The fact remains that in 24 of these married couples prevention of conception, and sometimes abortion, caused one child matrimony. In many instances the husbands did not hesitate to state that they wanted to have only one child, for the ordinary reasons that are known to all of us; in others there were special causes assigned, some valid, others as trifling as could be imagined. In the latter class, one woman was afraid of a recurrent external ear furunculosis which had developed during her first pregnancy and which could not be allowed to recur as it would cause deafness. The fear of hereditary transmission of disease was present in three instances of tuberculosis, but it developed only after the one healthy child had been born. In two there were valvular diseases, five had latent tuberculosis; in these seven the danger of pregnancy to the mother had been pointed out by the physician.

I refrain entirely from a statistical research of the other complications and sequelæ; this has been done and, as science advances, will undoubtedly require revision. The conclusions I arrive at cannot be looked upon as definitive, in that they are those of one individual working with material in one place. Upon the whole they verify Erb's conclusions, but in order that they be accepted it is necessary that many investigators in many places, and utilizing all kind of material, shall investigate the questions.

To recapitulate the results of my studies the following brief statements will be sufficient:—

I. The morbidity of gonorrhœa is diminishing.

II. The American Army and Navy are exceptions to this rule.

III. The present mathematical methods of deducing incidence of gonorrhœa in all men from morbidity lead to fallacious results.

IV. 54.1% of all males have gonorrhœa during their lifetime

V. We have not sufficient knowledge of the facts to state how many women have had gonorrhœa during their lifetime.

VI. The small number of my cases of sterility does not justify any positive conclusion.

VII. Prevention of conception is the cause of "one child sterility" in the majority of instances.

The object of my investigation was to determine the truth of the statements which have been made, in this country as well as abroad, by men and women who are interested in the suppression of venereal diseases. Whenever my figures have shown anything it is always that the propagandists have greatly over-estimated the frequency, the complications and the dangers of gonorrhœa. This has been notably the case with specialists in genito-urinary diseases in the male and in the female. With few exceptions, which have been referred to, these observers have done that which is natural to all of us—magnified their office. Moreover, many who have written have been satisfied with the old figures of Ricord (80% of all males have had gonorrhœa) which, combined with the views of Noeggerath, would make it appear that very few men and women could escape having gonorrhœa. If to this there are added the remarkable mathematical gyrations of Blaschko, which are supposed to represent statistical methods, it is little wonder that the layman becomes an anti-gonorrhoic howling dervish. This is seen especially in Germany, according to Erb, where the women

suffragists speak of an almost universal "poisoned wedlock" due to gonorrhœa, because no man enters matrimony healthy and pure, and his wife must suffer for the sins of his youth; of sterility increased and, therefore, countries depopulated.

That there is much damage done by gonorrhœa is abundantly shown by all statistics, therefore it is a righteous cause to fight for its reduction. But no righteous cause is aided by such lurid statements as have been made in connection with gonorrhœa. Eventually the truth will be found and the good cause will suffer because of exaggeration. The harm done by gonorrhœa is sufficient, even upon sober and sound investigation, to stimulate all of us to the necessity of combating the spread of venereal diseases. That they can be eradicated seems out of the question; that their frequency can be reduced has been abundantly shown. As physicians we are always ready to prevent disease; but we are not in a position to control the situation as we can in many other infections, for reasons manifest to all. We should therefore ask assistance for the earnest and intelligent cooperation of the laity who should be taught the necessity and importance of reducing the frequency of venereal diseases. The difficulties which beset the prophylaxis of venereal diseases are known to all of us, but much can be done by individual endeavor of the physician. Indeed, unless public opinion changes in English-speaking countries, not much more can be expected in the near future.

ARTICLE III.

THE COUNTRY DOCTOR'S RELATIONS WITH THE METROPOLITAN INSTITUTIONS AND SPECIALISTS.

By GILMAN OSGOOD, M.D.
OF ROCKLAND.

READ JUNE 10, 1908.

THE COUNTRY DOCTOR'S RELATIONS WITH THE METROPOLITAN INSTITUTIONS AND SPECIALISTS.

A GREAT variety of circumstances determines the location and future work of the physician.

The city, with its great hospitals and institutions of learning, affording ample opportunity for study and research, together with other attractions which go to make up city life, are great inducements to the ambitious physician.

The beauty of the environment, the comparatively short time of waiting before paying expenses, and other features, likewise attract its full quota to the country.

Having located in the country and entered into the professional life and activities of his adopted community, he adjusts himself to his surroundings, and in promoting the best interests of his patients, has certain definite relations with the metropolitan institutions and specialists.

The Country Doctor is obliged to take a broad view of the field of medicine, and although it is not his privilege to delve as deeply into any selected branch as does the specialist, it nevertheless is his judgment that decides many important questions.

He determines the necessity of transferring his patient to other hands for special treatment, and not infrequently is obliged to urge upon him the necessity of following the advice of the consultant before he will submit to operation.

It is not always easy to determine that he does *not* need the specialist's treatment and that cessation of work and change of scene are the best methods of procedure for the restoration of health.

And aside from individual advice and treatment given in all branches of medicine, *he* is looked up to as the one in his community to direct affairs that pertain to public health.

The skill and knowledge of the specialist is not to be expected of the general practitioner, who has to toil early and late and has little time to give to study and research. He is fully sensible of his short comings and would like to enlarge his field of knowledge had he the opportunity to do so.

The Country Doctor is seldom lacking in knowledge of human nature, and the estimate placed upon him by his city friends is reciprocated, in that he differentiates judgment from error, wisdom from folly, skill from awkwardness and honor from pretense.

It is not infrequently his opportunity and privilege to defend the specialist when he is attacked and his treatment criticised.

It is not always easy for the general practitioner to adapt himself to the teachings of our leading surgeons, and in attempting to do so, he sometimes meets with bitter experiences.

Formerly the Country Doctor did not send his gall stone cases to the surgeon, and although he had a few cases that suffered intensely from this affection, he at the same time saw many that had their attacks at infrequent intervals, and death from such cause was rare. To-day we are taught that the presence of gall stones is sufficient reason for operation.

In attempting to follow this advice we have seen death occur, and believe this patient would have lived had she not been operated upon. I am inclined to the belief that if all patients in the country known to have gall stones were operated on within the coming week, more harm than good would result from these operations; not that the patients

might not be better off without their gall stones, but because men of inferior skill would participate in this surgery.

If the general practitioner is to advise his patients to subject themselves to this major operation, and it becomes a matter of general knowledge among laymen that those with gall stones should be operated upon, should not they have the same protection from danger incident to the incompetent surgeon that is given by the State in protecting our communities from quackery?

In view of the profound effect of death following operation on some patients who themselves are in urgent need of the surgeon's assistance, and in consequence of which they refuse to be operated upon, we believe the effect of death following operation on the community at large should be taken into consideration before performing operations when such are practically useless. I also believe much good would result, would every member of our Society explain to our acquaintances of the newspaper fraternity, the difference between death from operation and death in spite of operation.

Notwithstanding the benefits many have been the recipients of by reason of modern medicine, we believe there *are* those who would receive greater benefit were they in the hands of the Old Country Doctor. He held their confidence and had such control over them that there was a proportionately smaller number in the community looking for the occult, such as *now* worship at the shrine of Christian Science, Mental Science, Osteopathy, Spiritualism and the like.

The time was when the Old Country Doctor was privileged to administer that mental medicine so comforting and so beneficial to those suffering from chronic disease. Today he is robbed of that power and the patient suffers that mental unrest incident to a want of confidence in his Doctor, as some one has told him that he is not having the

right treatment, and that the X-ray or something else is just what he needs; and we regret that these sentiments are not always promoted by men outside the profession.

The Country Doctor in looking over the field of specialists, selects for counsel, not only him whom he deems of good judgment, conservative, and skilled in the technique of his specialty, but he also requires that the consultant be a gentleman.

He likes that good judgment which is manifested by his diagnoses. He likes that conservatism which causes him to refuse to interfere unless there is good and sufficient reason for doing so; and when operation is clearly indicated he likes him to be bold, trusting that his skill will give to his patient that return of health or alleviation of suffering, for which he is seeking. And he requires of his consultant that gentlemanly treatment that enables him to maintain the respect of his patient when he is returned to him.

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The Country Doctor is sometimes *unjustly* criticized for his lack of knowledge, want of skill and general inefficiency in practising medicine. I will relate a few incidents that have occurred in the practice of the Country Doctor.

A charity patient, unable to journey to the city, required the services of a specialist; her physician informed the specialist of the situation, who volunteered his services, and without recompense and at a personal loss willingly came some distance to see the patient.

Such quality of mind and heart for which our profession is noted is not only appreciated by the layman, but also by its own members; and such incidents as these do more than words to cement the bonds of amity and good feeling between the Country Doctor and the city specialist. Although there may be times when the specialist is imposed upon by being asked to do work for a smaller compensation than the circumstances of the case allow, as the practitioner is himself sometimes unwittingly misled, yet I believe with few

exceptions, the Country Doctor so manages his work, that in looking after the best interests of his patients, he at the same time does not neglect the interest of the consultant.

I will here relate the story of a Country Doctor, telling the well-to-do father of a child, then in the hands of another physician and about to undergo an operation, that *he* could handle the case at little expense: that *he* could obtain the services of a well known city surgeon for a very small fee, naming the amount, and likewise a nurse, thinking that by appealing to the man's pocket book he would be able to purloin the case from his brother practitioner.

With regret I record a member of our profession in the country who not only treats his neighbors in an unprofessional manner, but extends his nefarious practice to imposition on the good nature of the city specialist. Likewise the city specialists have men within *their* ranks that may not be above criticism.

You will pardon me if I allude to a surgical case that the Country Doctor was going to operate upon, feeling competent to do so, but having passed to other hands through the intrigue of a brother practitioner who employed a city surgeon to do the work, the first physician by a peculiar combination of circumstances was obliged to be present, and to listen to an attempt at humiliation by this specialist, who allowed himself to be a tool of the other physician.

Later when this physician, who had been the target of criticism, which he felt undeserved, knew of this surgeon leaving a sponge within the abdomen of a patient, when repeated count showed one to be missing, solaced himself with the thought, that if he himself deserved criticism there were others who were not infallible.

I have sometimes wondered if certain consultants try to explain the reason for not being called into certain sections of the State, once so familiar to them.

Another example of conduct on the part of the city spe-

cialist, hard to understand :—Mr. B. having chronic Bright's disease as diagnosed by his attending physician, desired to consult a specialist and was directed to Dr.———. On his return he told his family physician that the consultant had informed him that he had no trouble with his kidneys, and the man who told him that he had did not know his business. Not wishing to credit this story, the Country Doctor wrote the consultant, repeating what had been told him and expressing a belief that there was some misunderstanding in what was told the patient, and asking for a renunciation of the statement if untrue ; and if true asking if such statement was warranted without microscopcial examination of urine. But as this letter written in a most friendly spirit brought no reply, the story as told by the patient was accepted as true, and this patient was forever lost to him.

One of the discouragements sometimes incident to the Country Doctor is manifested by the following incident :— a poor deformed girl with contracted pelvis and anchylosed hip was found in labor, and it was thought cæsarean section might become necessary, but was at this time able to be moved to the city. Telephonic communication with a doctor in one of the hospitals that take such cases was gratifying in that he thought there was no doubt but that she could be admitted, but the case must first be referred to his superior officer. But later, when put in communication with this physician, was very curtly told that we would have to take care of the case at home as they could not be bothered with our undesirable cases. If the dead ever return to earth, the spirit of Dr. Walter Channing would have certainly appeared to rebuke this action.

Incidents sometimes occur that give rise to the belief that patients are better cared for at home than in the hospital. I will relate such incident :—the only daughter of well-to-do parents, willing and ready to give whatever financial aid

that was necessary for her welfare, passed through eclampsia at twin birth, followed by a very slow convalescence, and later developed symptoms of incomplete intestinal obstruction. An honored member of our Society was called in consulation, whose suggestions were faithfully followed, and there being no improvement he was a second time called into the case, and fully appreciating the lack of improvement and the probability of the necessity of surgical intervention, suggested her removal to the City Hospital where he thought she would receive the benefit of the best treatment that could be given her. His advise was followed and a full history of her case, together with what had been done for her, was handed over to the doctor at the hospital. She occupied the best room in the hospital. Although her family physician and friends who visited her from time to time could see that she was gradually losing ground, they were assured by the house doctor that she was doing nicely. After a residence there of seven weeks she was told that she would be able to return home in another week; but almost immediately following this announcement her family physician received a telegram, summoning him to the hospital at once. The surgeon who had not previously seen her had been called into the case for the first time, had advised an immediate operation as the only means of saving her life, and had expressed regrets that he had not seen the case before. Although practically moribund at this time, gastro-enterostomy was performed and she promptly died. Had this operation been performed a few weeks earlier, when she could have better resisted the shock of operation, a perfect recovery would have been consistent with the post mortem appearances. The deductions drawn from this case are these:—patients whom we direct to the hospitals, where a large number are cared for, sometimes fail to receive that individual care they deserve, and sometimes instead of receiving the benefits of that expert treat-

ment which their case requires, may on the other hand receive their death knell, which in this case would probably not have occurred had she been kept at home.

One of the most respected members of our Society recently treated a young woman, suffering from pelvic pain and metrorrhagia following an abortion that was in no way open to criticism. A swelling appeared at the side of the uterus, and five weeks after the onset of trouble, thinking she would be benefited by hospital treatment, she was transferred to the Massachusetts General Hospital. During her residence there she was curetted, and at the end of two weeks was discharged. She returned home, but was not well and continued to have pain, and called in another physician to treat her.

When questioned as to the reason for giving up her family doctor who had treated her through her weeks of sickness, and who had gained admission to the hospital for her in order that she might have the best treatment, she said her reason for doing so was that the doctors in the hospital did not think much of her doctor; they had told her that in their opinion he was responsible for her sickness, and that there was no need of her having gone to the hospital at all. She also said they pronounced her all right at the time she left the hospital. To-day she is in bed without a nurse, suffering constant pain with a large tender mass at side of uterus, her faith in her family doctor gone.

Again the Country Doctor has had his patience tried when the Massachusetts General Hospital refused to take a case of acute appendicitis, that required immediate surgical treatment.

If the absent treatment of the Christian Scientist is open to criticism, is not also the absent diagnosis of the admitting physician of the hospital who pretends to determine the necessity for operation by a knowledge of temperature, pulse, and ability to walk, obtained by telephone, open to criticism?

We have seen cases of appendicitis with normal pulse, and temperature with free pus in the abdomen, and cannot forego the belief that the physician stating that he has an emergency case that requires immediate hospital treatment should be sufficient reason for its acceptance in a hospital that pretends to take emergency cases.

The Country Doctor once reduced a strangulated hernia under ether, and five hours later, believing intestinal obstruction still present, removed his patient to the hospital, a distance of twenty miles, who was told by the house doctor there was absolutely nothing the matter with him, but that he would keep him and operate for radical cure :—but before daylight the next morning laparotomy was hurriedly performed which revealed a block.

We are all too familiar with the superior knowledge possessed by a certain type of the recent graduate who has a hospital appointment. He is sometimes ungentlemanly enough to snub the suburban practitioner, and cast reflections upon him in the presence of his patient. Such conduct is a reflection on the institution itself and those connected with it, and tends to estrange the general practitioner from those who cannot afford to incur his ill will and who are ethically bound to extend to him that same treatment that is due every honorable physician. The bonds of friendship between the Country Doctor and the great hospitals would be strengthened if more consideration was shown the poor patient in financial matters. Authority vested in hospital officers is sometimes manifested by such rudeness as to occasion comment, and there is to-day a widespread criticism not only of the treatment of patients, but of their friends who call to visit them or inquire after their welfare.

These remarks are not those of a pessimist, and are not intended as unfriendly criticism, but rather of friendly suggestion. We have an abiding faith in our profession and its members, and will strive to maintain that high standing

which it deserves. The profession does not ennoble the man; the man however may ennoble the profession. What a man can accomplish depends on what he is; he can never transcend his own mental or moral stature, and his opinions however wise will only have weight commensurate with his own character of mind and disposition.

The physician should under all circumstances be a gentleman, always courteous in speech and manner, towards all descriptions of persons. There always have been and will continue to be within its ranks, men who have not the wisdom to see that it is for their benefit as well as for the interest of others to treat their fellows as brothers. Personal experience in the executive work of a large hospital makes me charitable towards others, but criticism should not be withheld when we are promoting the interests of our patients and upholding the ethics of our profession. Neither will it be pleasing for us some day to read a parody on Elizabeth Barrett Browning's beautiful poem "Kindness first known in a Hospital," that will be entitled "Kindness not known in a Hospital." When the physician gives to his patients his highest consideration, when he fully realizes his obligations to his profession, then and not till then will be exemplified the teachings of St. Matthew—"Therefore all things whatsoever ye would that men should do to you, do ye even so to them."

Remarks by Dr. Maurice H. Richardson, of Boston.

I have found, this winter, great instruction in the history of surgery and medicine, in reading old files of the Boston Medical and Surgical Journal, beginning in 1828. One of the first things I saw was an editorial on the treatment of a London surgeon by the London Lancet. The Lancet started out to correct the faults of metropolitan surgery, and it had a great deal to say against the hereditary surgeon of the metropolitan hospital. Its comments in some ways were amusing, but not always so, for the Medical Journal of Boston took the Lancet to account for the malignity of its attack on the profession. It would be a good thing were the Boston Medical and Surgical Journal to republish its editorial of 1828.

Is it not a good thing to have in opposition to an overwhelming and perhaps overbearing and inconsiderate majority, an intelligent, alert, and determined minority? I feel that it is. And I have been glad that Dr. Osgood has spoken with fearless candor upon subjects which cannot but profoundly interest the whole medical profession.

In commenting upon this paper, the scope of which Dr. Osgood communicated to me some time ago, I have reduced my remarks to writing, for I long since realized that a man wastes rather than saves time by extemporaneous speaking.

The relations of the consulting surgeon to the general practitioner are not unlike those of the consulting physician and of the specialist; in some ways they are like those between the physician and the patient himself.

I have discussed in private with Dr. Osgood the points in his address, and I found that his ideas and mine were so similar that I had made a syllabus of my remarks very appropriate to the discussion of his paper, before I knew even the scope of it.

The first thing to be remembered in this discussion is that we—both physicians and surgeons, family physician and consulting surgeon—are human, and subject to all the infirmities as well as the virtues of humanity.

What is the virtue that does most to make life agreeable and worth while? Is it faith, hope, or charity? It is, without the least question, charity in the broadest interpretation; for charity means benevolence, unselfishness, good feeling, and kindliness; it means fellow feeling, humanity, goodness and brotherly love. While it means also the giving of alms, I do not include in my use of the word *charity* so commonplace, if so desirable a virtue. Furthermore, by a charitable act I mean, in our profession, a kindly consideration for the feelings of others, a generous and practical interpretation of the Golden Rule, and a life of obliging, accommodating, indulgent, good-humored consideration for the acts, and, more especially, for the errors and weaknesses of others.

The physician is the most sensitive of men. No calling, not even that of theology, stimulates more sharply a love of praise. No one is more indignant than the physician under the faintest breath of criticism. And no wonder, because ungenerous criticism of his acts may cause sorrow unutterable. Errors in law mean loss of money, or worse, loss of reputation or of liberty. Such mistakes cause, I believe, much less acuteness of regret and chargrin than our own. The legal profession is used to criticism and abuse. The very essence of law is strife. In medicine it is, or should be, union, fellow feeling, generosity. If there is strife, it is or should be for the same beneficent ends—for a favorable verdict in which all parties to the action benefit—patient, friends, physician, and consultant.

As we grow older we become more charitable. I have often wondered why. Is it not because we have learned our own need of generous treatment by others?

When a physician accuses another of neglect, carelessness, ignorance, for acts of the like of which sooner or later he finds himself the unfortunate source, he feels all the more acutely, because of his early uncharitableness, the lack of charity in others. When a man testifies in court against another man for the bad results of an overlooked disloca-

tion of the shoulder, how does this witness feel when he finds that he himself has made a similar and perhaps more inexcusable blunder? And when the surgeon assails a physician's diagnosis as the result of ignorance and inexperience, how does he feel when, on exploration, he finds that the physician is right? The only way to avoid such humiliations is in an unselfish regard for the rights and feelings of others—in the practical, every-day application of charity in the broad significance that I have given it. One can carry charity into magnanimity; with charity he can heap coals of fire; he can turn a bitter enemy into a lasting friend.

I have known the country doctor since the beginning of my practice—each year more and more intimately. He has the virtues and the faults of humanity, like the rest of us; but I do not believe that the consulting physician has any adequate conception of the life he leads. In a word, it is a life of self-sacrifice, of long and laborious hours, continued year after year without rest or variety; it is a life consecrated for the most part to those refinements which more than anything else make life worth living—the refinements of charity to which I have applied the words *benevolence*, *unselfishness*, and *kindliness*. The nature which is refined becomes by daily contact with suffering, both mental and physical, still more refined; the one which is naturally coarse and selfish becomes less coarse and less selfish.

We surgeons have laid almost all our disasters at the door of the medical practitioner. A death in appendicitis is because the operation is too late; a fatal hæmorrhage in gall-bladder surgery is owing to delay in diagnosis which has led to jaundice with its tendency to bleeding; a cancer of the breast is hopeless, because the diagnosis of benign tumor has led the patient to think recourse to a surgeon unnecessary; a badly united fracture, an unrecognized dislocation—every evil that we meet with is laid at the door of the overworked and poorly-paid practitioner of medicine.

Do we stop to inquire the circumstances of the delay? Do we learn that the doctor was not himself called until late, and that he did not lose a minute in summoning us? Do we know that he has been advising, year after year, an

operation for gallstones? And do we realize the difficulties of diagnosis and treatment in fractures and in dislocations?

I fear we do not act upon the fact that there are two sides to every case.

And does the general practitioner, when he criticises the consultant, always consider the possibility that there may be two sides to *his* case? Perhaps the man whom the general practitioner criticises for what it has been reported he said, did not say anything of the kind, especially if the quotation comes through patients; perhaps the metropolitan surgeon has done all he could possibly do to protect the physician from the consequences of his own error. It is indeed the rule for the consultant to defend in every possible way the good reputation of the physician. In my experience it is the custom to apply in such cases the Golden Rule. As far as my teaching and example can accomplish anything, they influence my students and colleagues toward kindly consideration for the rights of other physicians, and more especially for their good standing among their patients.

The trouble is that we begin our profession with intolerance, though we end it in charity; and the intolerance or the charity is just as common in the consultant as it is in the general practitioner, and *no more so*.

In many suits for alleged malpractice I have testified in the defence of physicians. These claims for damages have been founded upon criticism of treatment made by brother practitioners. True, the comment which starts the trouble may have been innocent enough. The effect is a suit for damages. The man whose perhaps thoughtless words have caused the suit may regret it as much as he please; he will be the unwilling witness, forced to admit that he said the damaging things. He is then in an unenviable plight. Or he may show his malignancy by a willingness that reveals his bias and dislike. In an outsider such a witness cannot but excite compassionate though severe criticism; for in the course of time he sees the tables turn: the defendant the witness; the witness the defendant. He is sorry to observe that the same regrettable qualities of malice and revenge prevail.

If we could only see a little way ahead, how easily could

such a humiliating spectacle be avoided! The lives of these men could be made pleasant by cordial friendship and support, had either realized, as I do, that no single act will stir a man to the depths of thankful appreciation, and will engender and cement friendship, more than that which defends the character against unjust accusations. No one could heap such coals of fire as the man who, feeling himself unjustly criticised, returns that unfriendly act with a generous one.

Another point of view from which the consultant should consider the attending physician is that of the measure of success attending the case, both in reputation and in money. The surgeon—and I am qualified to speak for him alone—gathers the bulk of reward, both in reputation and in treasure. The physician shares a little in the reflected brilliancy of a successful case, and a little—very little, I fear—in the financial return. I know that he gets little credit for his timely diagnosis and for his efficient after-care. Yet the whole success of the treatment often depends upon timeliness of intervention and skill of after-treatment. Else why does the physician get so much censure for delay, and why do so many surgeons insist upon patients coming to their own hospitals?

But the achievements of success are best measured by the responsibilities of failure. The lay of the voyage in the time of Nantucket's prosperity in the whaling fisheries was allotted wholly by the responsibilities of the catch: the captain had by far the largest ratio, a half; the harpooner, say, a twelfth; the man before the mast a two hundredth; and a greenhorn a two hundred and fiftieth or a two hundred and seventy-fifth of the net proceeds*—each fractional part of the "stock" being measured by the captain's estimate of the responsibilities. And who is held responsible by the owners for the failure of the voyage? It is the captain, and he alone. And who is responsible for one and all of the elements of failure in a surgical operation (except the diagnosis and the selection of a surgeon)? It is the man who operates. Can he divest himself of any of his responsibilities? Not of a single one—from the complications of the ether to the scalding of his

* Melville in "Moby Dick."

patient; from the preparation of the field to a hernia in the scar. And it is right that he should be thus held responsible. Furthermore, he should insist upon the right of being held responsible, lest those least able to bear blame be made to carry the bulk of it. He should, under the great and almost constant rewards of success, gladly assume the infrequent blame of failure. And he should do this as a matter of right and justice to those least able to endure injustice, even if he leans to over-censuring himself. For example, he may try to escape his own responsibility by blaming nurses for a wrong count as the cause of his leaving a gauze in the abdomen; by blaming a nurse because after he has left the house she has burned his patient; but these are mistakes for which he is held legally responsible. He is in a sense responsible, for, although he relies on his nurses for a correct count and for careful inspection of heaters, it is his duty to see for himself, by multiplied precautions, that no gauzes are left in the wound; and his last look at his patient, and his last instructions to his nurse, must be with a view to guarding the patient against the accident of burning. When, in spite of great vigilance, an accident does occur—as, from human frailty, it surely will—let the surgeon generously take upon his broad shoulders all the responsibility he possibly can.

It seems unjust that I should have been held responsible for the blisters on the heels of a patient when the nurse placed the hot water bottles under them after I had left the house; but this blunder would not have been made if I had personally warned the nurse against it. I am glad to say that this experience of 1891 has served to protect from this accident many a patient since.

There are certain responsibilities which the layman does not appreciate: one is the anæsthetic and the other is the medical opinion. Yet if an accident happens during the administration of the anæsthetic, the surgeon is mulcted in heavy damages for allowing an uneducated person to give the ether. Nevertheless, I find patients frequently protesting against paying a fee for this very responsible part of the operation. In the country the attending physician usually gives the ether. I doubt if he ever gets a fee of any kind for that, though as a rule he gives the ether uncommonly well.

For making the early diagnosis upon which the surgeon's success depends, does the attending physician get an adequate fee or adequate appreciation? Far from it. He is lucky if he is not blamed for not being swifter in diagnosis; while his reward is contemptibly small.

We consultants do not always get the point of view of the practitioner who sends us his patients; and I do not know that I have it accurately even now. In surgery I am inclined to believe that one source of irritation lies in the surgeon's keeping patients for himself when they are sent perhaps merely for an opinion, and the physician expects to perform the operation if one is advised.

This theme opens up a broad field for discussion, for it suggests other topics upon which one can speak only with great delicacy. But perhaps they are the most important things that I could say.

Doubtless, in some cases I have assumed charge of patients who were sent to me for an opinion only. I do not know this to be a fact in more than a single instance, when I was indignantly reminded by the physician that he thought himself perfectly competent to perform the operation. I was very much surprised and mortified, because it was, in fact, a simple operation (cancer of the lip). But I assume, unless advised to the contrary, that a patient is sent me for opinion and operation, if operation is deemed advisable. The last thing in my mind is to take from the physician any patient, unless that patient is freely sent me. I do not know the feelings of other consultants, but I agree with what John Homans used to say: that no patient ever yet lived who was worth getting at the slightest loss of self-respect, or at the slightest unfavorable criticism of one's acts.

Whenever a brother practitioner does anything that we do not like, why is it not the best possible time to apply broadly the principles of charity, as I have said, and assume that the circumstances were such that the act was unavoidable, rather than to assume that it was hostile, selfish, unethical and reprehensible? I have felt the tendency towards uncharitableness in construing an act which seemed indefensible, and I have lived to be ashamed of the feeling.

That is the fact with me, and I have no doubt that it is

the fact with other consultants. Nothing places a man in so disagreeable a position as the taking of another man's patient—no matter what the justification—unless that patient is handed over with the sincere, honest wish that the recipient take charge of the case. We are human and subject to human frailties, but the most displeasing thing in my whole professional life has been the unavoidable supplanting of another man in operating upon a patient. I use the word *unavoidable* advisedly. There are circumstances under which the surgeon or the physician *must* take the patient. In my whole life I have had only two such experiences, but, to this day, they cause chagrin and regret. The mortification was thrust upon me, in a way that I could not, without churlishness and pettiness and lack of generosity, avoid. The kindness and real charitableness with which the surgeons treated me in my disagreeable dilemma did more to make lasting my friendship and regard for them than anything else they could possibly have done.

We do not grab patients, or seek to divert them to ourselves or others; but we do assume, unless told to the contrary, that patients sent to us are sent for diagnosis and treatment. All that the physician has to do when he wants an opinion alone, is to say so, and his wishes will be respected.

This leads me to the most delicate topic of all: Supposing the physician proposes to perform the operation which the consultant deems wise, what is a conscientious surgeon to say when he thinks the hazard unduly increased by the physician's want of experience? What is the surgeon's duty to his patient and to the physician and to himself?

I thought the other day that if I had operated on a certain breast tumor which I pronounced medullary cancer, and which the attending physician did operate on, I should have detected its benignity, and should have avoided sacrificing the breast. Should I? Before I had gotten quite over considering the question of this physician's fitness for operating—when the diagnosis of medullary cancer demands to-day the most extensive dissection—the breast came into Dr. Whitney's laboratory, and the tumor was conspicuously an encapsulated fibroma. Then I said again that I believed an experienced surgeon would have detected the benignity of the growth in time to save the breast.

But about that time I operated myself upon what I thought to be an almost hopeless, infiltrating cancer of the breast, and found—what do you suppose—after removing breast and pectorals and dissecting the axilla to the first rib? Not a sign of cancer then or at the laboratory examination, but a chronic abscess of the breast. The operation, I must say, was a great success; for healing was by first intention, cure was complete, and there may have been a malignant origin in the case—the patient was a woman of 65. But how about fitness based upon experience, criticised in the case of my friend the general practitioner?

I believe it to be our duty to discourage an operation of magnitude and danger if it is to be performed by one who never has been and never can be experienced in reading living pathology, or in making living dissections—unless immediate operation is absolutely indispensable to life, as in strangulated hernia. I do not refer to moderate experience, but rather to *inexperience*. One must exercise charity in his estimation of another man's ability. But how about charity toward the patient in the presence of the other man's inability?

My hearers will, I am sure, realize the difficulties in commenting upon this theme. It is so hard to discriminate between one's own selfishness, the patient's welfare, and the rights of the attending physician. But, candidly, is it not true that an operation—say for gallstones, ulcer of the stomach, uterine fibroid, interval appendix, movable kidney, in a word, for any condition in which operation is not imperative—is it not true that operation for such conditions had better be advised against if to the dangers unavoidable in all operations (from anæsthesia to suppression of urine) is to be added the avoidable one of inexperience on the part of the operator? If we all admit as true what I am sure we cannot but feel to be true, we shall candidly admit that no one should practise surgery without adequate preparation.

I am not, however, considering adequate experience in surgery, but rather adequate reasons for certain duties to the physician and the patient on the part of the consultant.

The relations between institutions and the medical and surgical community are perhaps the most difficult to main-

tain with impartiality and at the same time without friction; and yet the managers of institutions have a most difficult and exasperating rôle to play. When I have had occasion at times to lose my temper and to criticize severely certain acts, I have always found upon careful inquiry that there were seldom wanting good reasons for those acts. Not that I would endeavor to maintain perfection or infallibility on the part of a much tried group of men, but I would remind everyone who feels that he or his patient has not been treated perhaps with as much consideration as the circumstances demand, that many of the complaints on the part of the patients are without just foundation; that many if not all of the real errors occur in spite of great care on the part of those in authority; and finally that institution-men are, like general practitioners, an overworked and underpaid body, subject to criticism on the part of trustees, staffs, visiting committees of laymen, tax-payers, fee-dodgers, professional clientèle, and finally an exacting and unreasonable public.

I have never carried complaints to the front door at the Massachusetts General Hospital without coming away feeling ashamed that I had added unnecessarily, and usually unjustly, to the heavy burdens that those who were running the hospital were already carrying. Perhaps no group of men have greater need of a charitable consideration of their acts than those who devote their lives to institution work.

Finally, I wish to repeat and emphasize the beneficent effect of a charitable construction upon all acts which at first sight, and on one-sided evidence, we are inclined to condemn; and to say that charitableness is not incumbent upon the surgeon any more than upon the physician; it is not incumbent upon the hospital authorities any more than upon the patients and their friends and physicians. No activity in human life is more dependent, for its success and pleasure, upon friendly and generous coöperation, than the activities of the medical profession.

ARTICLE IV.

THE IMMEDIATE TREATMENT DEMANDED IN CERTAIN OF THE MORE SERIOUS OCULAR CONDITIONS THAT ARE FREQUENTLY FIRST SEEN BY THE GENERAL PRACTITIONER.

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THE IMMEDIATE TREATMENT DEMANDED IN CERTAIN OF THE MORE SERIOUS OCULAR CONDITIONS THAT ARE FREQUENTLY FIRST SEEN BY THE GENERAL PRACTITIONER.

While a certain number of men in general practice have given special attention to ophthalmology and are prepared to treat most of the cases coming under their care, the larger proportion, if I can judge correctly, prefer to limit their practice in this branch of medicine to its simpler diseases and to transfer those of a serious nature to the oculist. It nevertheless not infrequently happens that the family physician from one cause or another is obliged temporarily to assume the responsibility of a case that is of undoubted gravity, and the question of the immediate and proper treatment required under such circumstances is naturally an important one.

ACUTE GLAUCOMA.

A disease in point, and one that can justly be ranked first among what may be classed as emergency eye cases, is Acute Glaucoma. No man in general practice will willingly treat a case of acute glaucoma longer than is absolutely necessary, for the reason that the only curative treatment is operative and the longer operation is delayed beyond a certain period the less favorable the outlook for the restoration of vision. It is nevertheless the family physician who is usually first called in these cases, and the general upset, that is, the severe pain, the nausea and vomiting so often accompanying the disease and prostrating the patient will

at times overshadow and obscure the seriousness of the ocular condition. It is essentially a disease of middle life and old age, and its symptoms as we know are dependent upon a rapid and very considerable increase in the intra-ocular tension. The pain in the eye and head, the nausea frequently accompanied by vomiting, the ocular injection, the rapidly failing vision, often reduced to the ability to count fingers within twenty-four hours; the increased tension, the haziness of the cornea, the narrowing of the anterior chamber, and the enlargement and immobility of the pupil, all point to a serious condition and one requiring prompt and energetic treatment. The value of certain of these symptoms in making a diagnosis of acute glaucoma and in differentiating it from iritis, a disease with which it is often confounded, is, of course, dependent upon one's experience as an observer of pathological conditions in the eye. A man whose experience has been limited may or may not be able to make out an increase in the ocular tension. The same may be said as to the narrowing of the anterior chamber, and, unless it has become marked, the haziness of the cornea as well. The condition of the pupil, however, will be easily recognized and may be regarded as the key-note of the situation. In iritis, it is small and inactive. In glaucoma it is larger than the pupil of the other eye, usually much larger, and is sluggish or absolutely inactive to light. Given, therefore, a congested, reddened eye, an enlarged inactive pupil, rapidly failing vision, pain, and nausea, there is little chance of error in making a diagnosis of acute glaucoma. Severe pain, nausea and vomiting are not always prominent symptoms, but it is especially these cases, where the general disturbance is so severe that the patient takes to his bed, that are least liable to receive the prompt treatment so essential in preventing absolute, incurable blindness. The immediate treatment demanded in such a case is the use of a myotic in an effort to contract the pupil and relieve tem-

porarily the symptoms until arrangements can be made for an iridectomy. It is well to begin, I believe, with a 2% solution of pilocarpine nitrate, instilling two or three drops into the eye every half hour. If at the end of four or five hours no contraction of the pupil is apparent, a 1% solution of the stronger myotic, eserine sulphate, should be substituted and used with equal frequency. The acute symptoms will generally, but not always, lessen in intensity after a few hours and there may be a very considerable improvement in vision. With this improvement, it is well to reduce the frequency of the myotic to once an hour or even to once in two hours, as the conditions may seem to indicate. Because of the intense pain in some of these cases, morphine may seem advisable, but it is well to avoid giving it when possible in order that the effects of the myotic may be more satisfactorily observed. Hot fomentations are sometimes of value in adding to the comfort of the patient, and an early saline cathartic is beneficial in this as well as in most acute ocular disturbances. Iridectomy should not be delayed for more than three or four days, even when the symptoms yield readily to a myotic, and more prompt interference is demanded if they persist in intensity under this treatment. It is sometimes difficult to make the patient believe that operation is imperative if vision returns and these severe symptoms rapidly disappear, but strong assurance can be given that the attack will recur unless the eye is operated upon and that early operation gives the best visual result.

IRITIS.

It would be unnecessary, perhaps, to classify iritis among the more serious ocular diseases if it were not for the fact that it occasionally gives rise to an extremely grave condition where appropriate treatment has been delayed. In the absence of pain, for example, the patient may fail to report to the physician until the pupil has become almost completely adherent and vision greatly impaired by exudate

onto the anterior surface of the lens. In other cases the trouble is mistaken for conjunctivitis and the result may be equally unfortunate. When the points made prominent in the diagnosis of this disease in many of the text-books of Opthalmology are considered, one wonders how it is possible to mistake it for conjunctivitis, but the "characteristic symptoms" in this, as in many diseases met with in the practice of medicine, are not infrequently most conspicuous in their absence. Every oculist meets with cases of iritis where he hesitates in making a positive diagnosis of iritis until he has instilled atropine or some other mydriatic and found iritic adhesions to be present. Of the usual symptoms supra-orbital pain may be entirely wanting, intolerance of light and increased lachrymation insignificant, the circumcorneal injection very moderate, the discoloration of the iris a little doubtful, the pupil not greatly contracted, and its reaction to light fairly good. Such cases are not the rule, however, and there are usually a sufficient number of iritis symptoms present to make the diagnosis a practical surety before a mydriatic is used. The symptoms most constant and to be depended upon are the pinkish zone of injection surrounding the cornea in connection with a contracted pupil that reacts sluggishly or not at all to light. Added to these we shall probably find a discoloration of the iris, and a greater or less degree of supra-orbital pain, but the first two symptoms in the absence of any corneal lesion almost invariably mean iritis. It is not difficult to eliminate conjunctivitis when these symptoms are present, and if any doubt exists in the mind of the physician it is better to instill atropine, or by preference a more transient mydriatic like the hydrobromate of homatropine (2%) and determine the existence or non-existence of iritic adhesions. While the absence of adhesions does not absolutely exclude iritis, other symptoms of the disease will usually quickly become prominent after a mydriatic has been used. The essential

treatment is, of course, the use of a mydriatic, usually atropine sulphate, of sufficient strength and frequency to dilate the pupil as widely as it is possible to dilate it. To prescribe a ½% or even a 1% solution for the patient to use at home does not, as a rule, meet the emergency of the case. He should be kept at the office and a drop or two of a 4% solution placed on the inner surface of the lower lid and this repeated four or five times at ten-minute intervals. Under this treatment, many, if not all, of the existing adhesions will usually give way and there is little danger of fresh adhesions taking place if the pupil is now kept dilated by a weaker solution of this drug. It is important in using the stronger solutions of atropine, to have the patient keep the end of the finger firmly pressed upon the inner angle of the eye for three or four minutes after each instillation. This will prevent in a great degree the escape of atropine by way of the tear passage into the nose, and the consequent dry throat and other mild symptoms of poisoning which occasionally take place. Judging from the cases seen in consultation, the atropine solution prescribed by men in general practice, for home use, is often not of sufficient strength, or used frequently enough to give the best results. A 1% solution is none too strong, and instilled three or four times a day will meet the requirements of the average case. A pupil cannot be too widely dilated in iritis, and a dryness of the throat, which is the only unpleasant symptom to be expected, can be minimized in the manner just mentioned. There is one point in connection with the use of atropine in this disease that I have never seen mentioned in any literature on the subject, although it has undoubtedly been noted by most men who have cared for any considerable number of these cases; and that is, that supra-orbital pain is not infrequently absent, or at least very moderate until atropine is used, when it may become severe and so continue until the inflammation begins to

subside. It is therefore wise to inform the patient of this fact in the beginning and to impress upon him that this is unavoidable, and no indication for discontinuing the treatment. Another remedy that is at times of great value in the early stages of the disease is the application of leeches to the temple. They are especially indicated in those cases where the pupil fails to dilate widely, not so much because of the existence of adhesions as to the intense degree of iritic congestion. The importance of discovering and treating early the disease upon which the iritis is dependent, of the use of a saline cathartic, of hot fomentations for the relief of pain and of sufficiently protecting the eyes from the irritating effects of bright light, are well-recognized routine procedures and require no detailed consideration.

OPHTHALMIA NEONATORUM.

The subject of ophthalmia neonatorum as a cause of blindness has been frequently presented to the medical profession, and the present work of a committee of the American Medical Association in an effort to secure uniform legislation in the various states for the better control of this disease well emphasizes its importance. Blindness in a child is a pathetic condition, and especially is this so when it results from a disease that almost invariably terminates favorably if recognized and properly treated in the beginning. In other words, blindness from ophthalmia neonatorum in a very large proportion of the cases means blindness from neglect. While it is probable that these patients are better cared for in Massachusetts than in the majority of the states, one reason being that midwife practice is not common in this community, blindness from this cause is nevertheless much more frequent than is generally supposed. At the Boston Nursery for Blind Babies, as a single example, Dr. R. G. Loring informs me that there are 51 patients, and that in 31 of these blindness is directly traceable to this disease.

The nature of the trouble is well known. It is a puru-

lent infection of the conjunctiva, in the large majority of cases gonorrhœal, and the infecting organism enters the child's eye during the passage of the head through the vagina or soon after birth. For obvious reasons it is more prevalent among the poorer classes than among the rich and well-to-do. It is doubtful if many oculists in this neighborhood average more than one case of the disease a year in private practice, while in the larger charity clinics it is quite the rule to see two or three in a single week. Last year at the Massachusetts Charitable Eye and Ear Infirmary, we treated 171 cases, all of them as in-door patients. It may not be out of place to call attention to the fact that the facilities for treating this class of cases at the Infirmary are not excelled, if they are equalled, by any institution in the world. The Gardner Building for infectious and contagious diseases is practically completely separated from the main building, the only connection being a basement passageway. The third floor for contagious general cases has a separate stairway from the basement, so that there is absolutely no connection between this Ward and the first and second floors devoted to infectious eye cases. Of the 27 beds, the large proportion are available for ophthalmia neonatorum patients, and this department is not only thoroughly equipped for the care of the eyes but for the general care of these unfortunate babies as well. The symptoms of the disease need not be referred to in any great detail. It is simply necessary to remember that an inflammation of an eye in a new-born babe, accompanied by a purulent discharge, is almost without exception ophthalmia neonatorum. As a rule it appears between the second and sixth day after birth, but when there is a want of cleanliness and care infection occasionally takes place later. The great danger is of infection and ulceration of the cornea, and while it may develop at any stage of the disease it is more liable to occur in the first and second weeks when the discharge is

more abundant and virulent. It is not very exceptional to have cases report with the history of an inflammation of but a week's duration, and to find one or both corneæ ulcerated to such a degree that vision is practically destroyed and with little or no chance of its being restored by treatment or operation. The importance of early treatment therefore cannot be too strongly insisted upon. While it will be generally admitted that the oculist is better qualified to treat these cases than the general practitioner, it is nevertheless the general practitioner who usually first sees them and is often forced by circumstances to assume the immediate care and responsibility. If I may be permitted to wander a little from the subject of this paper, I will say just a word in regard to preventive treatment. The well-known Créde method, that is, dropping one or two drops of a nitrate of silver solution (1% or 2%) into the eyes immediately after washing them at the time of birth, is undoubtedly of great value and is systematically used in many of the lying-in hospitals. Among private patients, it has never been very generally adopted, perhaps for the reason that it sometimes causes considerable temporary irritation and the physician hesitates in making it a routine practice. With the newer silver salts, however, the question of irritation can be eliminated. For example a 25% solution of argyrol is practically non-irritating and will cause no more feeling of discomfort as a rule, often not as much, as a 3% solution of boric acid. To instill four or five drops of a fresh solution of 25% argyrol into the conjunctival sac of every newborn babe would be a simple, and I believe a very efficient means of prevention. Among certain classes neglect of all matters pertaining to health and cleanliness is, of course, the rule and it is to be expected that an inflamed eye will make little impression until the disease has become well advanced. It is this delay of the family in promptly notifying the physician which is undoubtedly accountable for

many lost eyes. To make any appreciable change in the nature of these people is, of course, not to be expected. It should nevertheless be the duty of every physician attending a confinement case to try and impress upon the more intelligent members of the family the importance of sending for him at once if the eyes become inflamed and discharge matter.

While there is naturally some difference of opinion among oculists as to the care of these cases, they practically all agree that keeping the eyes clean and free from pus is the most important factor in ensuring a good recovery. This means washing the eyes every fifteen or twenty minutes with a boric acid solution, and is most satisfactorily carried out when two nurses are in attendance, one for day and the other for night duty. When nurses cannot be promptly obtained, or circumstances render their employment an impossibility, two members of the family or friends should be carefully instructed in the work until better arrangements can be made. In cleaning the eyes, the inner angle and edges of the lids, which are usually tightly shut, should be freed from discharge by means of a bit of absorbent cotton wet with the solution. If the lids are then separated most of the retained secretion will escape and what remains can easily be dislodged by taking another bit of cotton thoroughly saturated with the solution, holding it an inch or two above the eye and then by pressing it allow a stream to flow gently into the conjunctival sac. The lids should be dried and four or five times a day it is well to apply a little simple ointment to their edges, not only to prevent them from becoming glued together, but also for the reason that they are liable to become irritated from the constant washing. There is one caution which should be given to the nurses or attendants doing this work that is of the greatest importance, and that is frequently neglected, and that is, to have their fingernails trimmed as short as possible, for if a slight abrasion

of the cornea be made by a fingernail in the process of washing the eye or separating the lids, it will be quickly followed by infection and ulceration. The constant cleaning of the eyes, night and day, seems to have little ill effect upon the general condition of these babies. They soon take it as a matter of course and eat and sleep as under usual conditions.

Next in importance to cleanliness is the use of some silver salt, and the question as to what preparation gives the best results is still a matter of discussion. At the Massachusetts Charitable Eye and Ear Infirmary we have practically given up the use of silver-nitrate, replacing it by the newer salts, protargol and argyrol. In a paper* read before the American Ophthalmological Society, two years ago, Dr. Myles Standish gave some interesting comparative statistics. Of 50 cases treated with silver nitrate there was subsequent infection of the cornea in three cases, or 6%. Of 150 cases treated with protargol, there was subsequent infection of the cornea in three cases, or 2%, and of 201 cases treated with argyrol there was subsequent infection of the cornea in four cases, or 2%. These results certainly prove conclusively the value of the newer and less irritating silver preparations in the treatment of this disease. A 25% solution of argyrol may be used freely every four hours, and in cases of exceptional virulence even oftener than this with advantage. In applying the remedy, the child should be placed flat on the back, and the head so turned that the solution will not quickly escape from the eyes. The lids being separated with the thumb and finger, six or eight drops should be instilled with an eye-dropper, and there need be no fear of harm in using even a larger quantity. Careful instructions must be given, however, that the end of the dropper is not brought in contact with the cornea or the instillation made with too great force. This treatment, frequent cleaning of

* "Silver preparations in Conjunctival Diseases," also published in "Ophthalmology," Aug., 1906.

the eyes, and the use of argyrol, if it can be thoroughly and systematically carried out, will with rare exceptions insure a perfect recovery. I cannot but urge, however, the advisability of transferring the cases met with among the poorer classes to the Massachusetts Charitable Eye and Ear Infirmary, or some similar institution as soon as it can possibly be arranged. This is advisable not only for the good of the child but for the safety of the other members of the family as well. For the fact must not be lost sight of that the disease is usually gonorrhœal, and that if the eyes of an older child or an adult become infected it means an inflammation of even greater seriousness than when present in the eye of the new-born babe.

PERFORATING WOUNDS OF THE EYE-BALL.

A class of cases that I wish to refer to briefly in concluding this paper are the perforating wounds of the eye-ball. A perforating wound, that is a wound made by some foreign substance passing through the cornea or sclera, must always be regarded as a serious condition whatever the nature of the object causing the injury. Not infrequently the immediate result is a blind and deformed eye, and eneucleation is the only question to be considered. More often, however, an effort must be made to save an eye that will be of some value as an organ of vision, or if this is impossible, one that is at least to be preferred to an artificial eye, and that will not endanger its fellow. The larger majority of these patients are working people, machinists, stone-cutters, and the like, and while a certain number immediately enter a charitable institution, and come under the care of an oculist, many others for the reason that they live at a distance, or for some other cause, are first seen by a man in general practice. It is to be expected that a perforating wound will be followed by inflammation although it is by no means an inevitable result. At times a general suppuration of the greatest intensity will make its appear-

ance soon after the injury and treatment seems absolutely of no value in allaying its progress or in preventing a destruction of the globe. In the general run of cases, however, such an unfortunate termination is not to be looked for, and if appropriate treatment can be received early, that is within four or five hours of the injury, the outlook is certainly much better than where treatment is delayed for forty-eight or even twenty-four hours. It will, of course, be understood that the following suggestions are in the nature of early emergency treatment, and that various modifications and changes may be demanded if a case is under one's care for any length of time.

First—To lessen the chances of infection, or at least farther infection, the lids and their immediate neighborhood should be thoroughly cleaned, and the conjunctival sac irrigated with a boric acid or some other mild solution. It is impossible to make the conjunctival sac absolutely sterile, but if the patient is placed on the back, the lids separated and the eye washed out with three or four dropperfulls of a boric acid solution, it will at least be clean.

Second—A 1% solution of atropine should be instilled three or four times at five-minute intervals for the reason that iritis will develop in at least 80% of these perforating injuries. If atropine is not used, and numerous iritic adhesions take place, as they frequently will within twenty-four hours, they may very seriously interfere with the future successful treatment of the eye. If the anterior chamber is evacuated, the pupil will not dilate until it is re-established. It is nevertheless advisable to use atropine so that its effects may be obtained as early as possible after the chamber begins to refill.

Third—Some simple non-irritating ointment, a piece the size of a pea, should be placed on the inner surface of the lower lid, and the eye then bandaged (except in certain injuries that I shall refer to presently). A valuable ointment

for this purpose is the so-called White's Ointment, compounded as follows:

℞	Hydrarg Bi-cholrid	gr. $\frac{1}{12}$
	Sodii Chlorid	" $\frac{1}{2}$
	Petrolati	ʒiv

If this cannot be readily obtained, plain vaselin will very well answer the purpose.

Fourth—A good dose of Epsom salts, calomel, or some other active cathartic should be given, and,

Fifth—A leech to the temple is good routine practice, and at times is of the greatest value.

When the eye is bandaged, if the pupil is well dilated, it is usually unnecessary to change it oftener than twice a day; the eye being thoroughly washed out, atropine instilled, and the ointment applied at each dressing.

In injuries from dynamite, powder explosions, fire-crackers, etc., where the conjunctiva and the lids are usually more or less burned and lacerated, exceptions are to be made in this treatment especially as regards bandaging. These cases are very liable to develop a muco-purulent conjunctivitis, and many eyes are lost by a secondary infection of the cornea. Closing up the eye by bandaging under such circumstances would certainly add to the danger of infection. From my experience I believe the best results are to be obtained by washing out the conjunctival sac every fifteen or twenty minutes with a boric acid solution, applying boric acid ointment to the surface of the lids, and in using cold compresses for the first two or three days; not omitting, of course, the instillation of atropine as often as the condition of the pupil may demand.

A delay in transferring these patients to the care of an oculist is, of course, often unavoidable, but a special effort should be made in cases complicated by a prolapse of the iris requiring abscission, and also where the perforating object is a bit of steel lodged in the interior of the eye, and whose removal necessitates the use of a magnet.

DISCUSSION.

Dr. David Harrower, of Worcester: I am sure we are greatly indebted to Dr. Cheney for the very interesting paper he has given us, and the differentiations that he gives of the cases, especially between Glaucoma and Iritis. It is very important for the general practitioners, I think, to recoginize clearly the distinction, and Dr. Cheney has drawn that out in great detail.

There is one thing I think might be added, and that is the determination of the anæsthetic of the cornea, which can be tested with a small piece of absorbent cotton twisted up, and the cornea touched with it.

Now in ophthalmia neonatorum I do not think that every one who comes in contact with it realizes the importance of treating it early; or perhaps recognizes it in its first stage. At least sometimes we get these cases, coming to us in a deplorable condition, with the cornea affected. Our great effort then is to save as much as we possibly can of the eye. For treatment, as Dr. Cheney has said, we must depend upon free irrigation, and the use of silver salts. I think almost every practitioner is more apt to have his nitrate of silver with him than argyrol or protargol, and nitrate of silver is much easier for him to use unless he has adopted the newer silver salts.

In the maternity ward at the City Hospital in Worcester, all babies born there have their eyes washed out with a solution of boracic acid, and then a 50% solution of argyrol is instilled.

In Worcester we see a great many cases of perforating wounds of the eye-ball, as in that city there are many manufacturing concerns that use iron and steel. In the wire works, where they employ about 6000 men, a great many accidents to the eyes of the men happen. In the olden days, before the present method was adopted, when a perforating wound of the eye occurred, the man went out, and if he had any attention, it was generally given by his family physician; if the eye became infected, which it very often did, the patient came to the hands of the oculist three or four days later, or whatever the time was.

We used to have a great many infected eyes from the wire works. Now, at the North and South works, they have established a temporary hospital. Whenever an accident occurs, the man is taken at once to the hospital, and his eye is washed out with a 1-6000 bichloride solution, and a sterile bandage applied to the eye, and I see him at once.

If the wound is severe, the patient goes immediately to the Hospital, where I attend him; if the injury is slight, I attend him outside.

It is astonishing to see the improvement in the fatality of these cases. Where we used to have a great many wounds, that would often have fatal results, we now, by taking care of them at once, can clear them up, and have the patient recover, if not with good vision, at least with a fairly good eye that he can carry around. Of great importance, therefore, in a perforating wound of the eye, is to clear it out at once with a solution of bichloride, bandage it up, and keep it clear until a specialist may see it.

Another thing that I think the general practitioner is very apt to meet with is burns from lime and iron.

It is very important in these burns to clear out every particle of lime and iron. In burning from lime we find a large amount imbedded in the lid when we evert it.

After removing this thoroughly, and washing out with sterile water, or boracic acid solution, then we can use liquid vaselin, castor oil, almond or olive oil. If the burns are very severe, of course the great danger is of symblepharon. Therefore, the burned surfaces must be kept apart by some substance such as oil, etc.

Another thing I think the practitioner is very apt to meet is an infected ulcer of the cornea, a slight wound of which will very rapidly become affected. This should be washed out at once with a solution of bicholoride and treated with 25% to 50% solution of argyrol.

ARTICLE V.

THE GROWTH AND DEVELOPMENT OF SURGERY IN THE SMALLER CITIES.

By CHARLES H. RICHARDSON, M.D.
OF PITTSFIELD.

READ JUNE 10, 1908.

THE GROWTH AND DEVELOPMENT OF SURGERY IN THE SMALLER CITIES.

No doubt many of the gentlemen present will recall the days when surgery was done entirely by men residing in the larger cities. There were even then very few men who confined their activities to surgery alone, for there was comparatively small demand for their services. The general practitioners of those days were *afraid* of surgery, and a surgeon was seldom called in except as a last resort, and then in the majority of cases only after the favorable time for cure by operation had passed.

Then again, in such emergency cases, it was no uncommon thing for a surgeon to be summoned from some city perhaps a hundred miles distant, and oftentimes half a day or more would elapse before the operator would reach his patient. The result of such methods were of necessity none too good, but the fault did not necessarily lie with the surgeon.

At a later period when asepsis was better developed, and the medical profession became better grounded in bacteriology and pathology, there was more demand for the surgeon. The more favorable termination of operative cases had its influence; the education of the people to the fact that calling a surgeon did not always mean death helped immeasurably and the physician became more alert in distinguishing operative cases from non-operative. Men began to devote their activities to surgery and, even at this early date, some took

it up as an exclusive line of work, and from that time surgery started on its progressive march, until to-day good surgery is by no means confined to the larger cities, nor are all the best surgeons located in such cities.

It is, however, only within the last ten or twelve years that modern, up-to-date surgery, as is carried on in the larger cities, has been duplicated in the smaller ones, and even in large towns of twelve or fifteen thousand population. In fact the development of so-called "country surgery" is so recent that, I think, it is safe to say that many of the men in New York, Chicago, Boston and such cities little realize that in the smaller places modern surgery is done, and every detail of operating room technique thoroughly carried out. The results, as are shown by the various papers, articles and reports from practitioners in smaller places would indicate that their mortality is at least in some places as low as in the large metropolitan hospitals. Modern surgery then to-day is carried practically to the door of everyone, and this evolution in the art has been brought about by three factors mainly.

First: Men who have located in the smaller cities and have established good reputations as general practitioners take up surgery to a greater or lesser degree, and get the support of their brother practitioners in surgical work. As their work increases in this line they gradually perfect themselves in technique by visiting the clinics and taking post-graduate courses, and in time many of them drop general practice entirely and devote all their time and attention to surgery alone. Some of our best surgeons of to-day are men who have done this very thing.

Second: A certain number of bright, clear-headed young men of to-day who are gifted with enough foresight to look into the future, discover the fact that in order to become a full-fledged surgeon, and command the respect of their brother practitioner and of the public, and to be able to meet

with competition from the man who has "worked himself into it," they must be thoroughly grounded to do the work and must have an education greater than that which one gets from a medical college or from one or two years' internship in a hospital. These men then, are, after they complete their hospital course, associating themselves with surgeons of recognized standing as assistants. After a period of two or three years "apprenticeship" they launch out for themselves, and do nothing but surgery for the start. These are the men who are gradually locating around in the smaller cities. They have been educated and trained in the details of asepsis and modern surgical technique. They practise surgery alone and do not enter into competition with their brother medical practitioner.

They, therefore, get the support of the profession in their own neighborhood, and in time also that from a large surrounding community and become successful men in their line of work.

Third: The Growth and Development of Major Surgery cannot be intelligently discussed without including the growth and development of the hospital as well. The hospital is almost a necessity to the man who does any amount of surgery. There are very few cities of twenty-five thousand population to-day, particularly if the center of any surrounding country, which do not have a public or a private hospital. These younger men with their modern training when going to the smaller places are usually welcomed on the board of the local hospital, and their advanced methods are more or less adopted, and thus the small city hospital duplicates in detail in a sense the larger one.

In a recent address Dr. Maurice Richardson, of Boston, points out the error so commonly made in the smaller city hospital of putting a great number of men on the staff and giving them equal encouragement to do the surgery that occurs in the hospital during their time as attending phy-

sicians or surgeons. As he says, "there are seldom more than one or two men in a comparatively small city who are competent to do major surgery." He indicates that the hospital would be much more successful if the support of the governing board and its physicians was given to the men who are by education and training best fitted to do the work, and that the hospitals would attain something more than a comparatively small local reputation.

I personally believe that a man who does not give the time necessary to thoroughly fit himself to do surgical work would be, in the majority of cases, far better off if he never attempted it. No better proof of this could exist than the fact that usually men who have the greatest reputation as physicians in every locality are those who do no surgery at all, except now and then an emergency case. By so doing the physician has the implicit confidence of his patients that in the event an operation is needed he will do everything in his power to secure a competent man to do it and not try it himself.

There can be no doubt that the control of a hospital has much to do with the success of a surgical practice. The establishment of private hospitals is becoming more and more frequent, and upon investigation I find that some of the most successful places in the country are private institutions which are conducted by a single man or a group of men associating themselves together, and thereby being able to control the policy of the institution. They are usually successful for the reason that the men associated with them make them so. It is the *man who makes the institution* and not the *institution that makes the man.*

No better example of this can be had than that of the St. Mary's Hospital in Rochester, Minn. There is probably more surgery done in this hospital than in any other hospital in the United States, but it is all done by the Mayo brothers and their assistants. It is probable that nine out of

every ten patients that go there do not know the name of the hospital; whether it is public or private; sectarian or non-sectarian. Furthermore they do not care. They go there to obtain the benefit of the art of surgery at the hands of either of the Mayo brothers, and the hospital is a secondary consideration.

This then is the reason that private hospitals are being established throughout the country by men who have a local reputation, and thus hospitals are managed by the men who come in contact with the patients, and know what they want and what they ought to have. It is given to them and the results are that private hospitals throughout the country are becoming very popular.

DISCUSSION.

Dr. H. G. Stetson, of Greenfield: I think we are indebted to Dr. Richardson, because we in the country, at least, think good surgery can be done in the small places. As he says, it has its advantages and disadvantages. In the small towns you do get good operators, but with a little bit of a disposition to run to the extreme; and as he says, the younger men feel that they can do operating even if they have not had the proper training to begin with. I believe that ultimately this will reach its level; that the man who can do the work and do it successfully, will do it, or a larger part of it, and the public will come to see that the experienced man is the one to go to, and not the family physician.

As he says also, in regard to the smaller hospitals and the men that are connected with them—it is the man that makes the hospital, and not the hospital that makes the man. A hospital is successful if it has a good working staff, if it has men connected with it who are capable of doing good work, both medical and surgical, and who command the confidence and respect of the physicians in the community in which it is situated.

The country surgeon in some ways has the disadvantage of his city brother, in that he is called upon many times to operate upon patients who are *in extremis;* patients who

have been allowed to go on longer than his brother in the city allows them to go on. They are more distant from the hospital, it is very difficult to transport them, and in consequence, by the time the surgeon sees them they are not in as good shape to operate upon as oftentimes they are in the city; and for that reason I believe that the city man, from the nature of his work, is able to do better work than the man in the country.

And again, I believe that, all things considered, in many communities in the State of Massachusetts (and for that matter, all over the country), there is excellent surgery done in the small country hospitals. And I should most heartily commend the statement he makes, that a man should not do general surgery unless he has some peculiar fitting qualities, and unless he has had some experience; and every man should not feel that he can remove an appendix, simply because he has seen some one else do it.

The country surgeon, the surgeon in the smaller communities, has come to stay. Whether at some future time every small community will have its one or two men who do surgery alone, I am unable to say. I am inclined to think that will be so; in communities of 8,000 or 10,000 people some one man will give up general practice and do surgery alone, and it is going to be for the benefit of surgery.

ARTICLE VI.

THE OCCURRENCE OF INFANTILE PARALYSIS IN MASSACHUSETTS IN 1907.

(With Especial Reference to Etiology.)

REPORTED FOR THE

MASSACHUSETTS STATE BOARD OF HEALTH.

By ROBERT W. LOVETT M.D.
OF BOSTON.

READ JUNE 9, 1908.

THE OCCURRENCE OF INFANTILE PARALYSIS IN MASSACHUSETTS IN 1907.

INFANTILE PARALYSIS (Anterior Poliomyelitis) is a fairly common disease which is followed by serious and most often disabling results in those affected. Its etiology is unsettled although it is generally considered as infectious in origin; it occurs in epidemics at times and is not free from the suspicion of being contagious. The epidemic of the disease which occurred in New York in the summer of 1907 was by far the most extensive ever reported in any part of the world, and left behind it hundreds of children crippled for life. Taking these facts into consideration, it seemed a suitable field of investigation by the Massachusetts State Board of Health in the interest of the public health, especially as it was reported to the Board by Dr. James J. Putnam that more cases than usual had been seen in Boston in the year 1907, although there was no evidence of any marked epidemic. The present report is to be regarded as a preliminary one, as the Board intends to pursue the subject further in the collection and analysis of future cases and in a bacteriological investigation of the disease already started by Dr. Theobald Smith.

In February, 1908, there were sent out to every physician in Massachusetts (some 6,000 in number) circulars asking them if in the year 1907 they had seen in their practice any cases of acute febrile disturbance followed by paralysis, especially in young children. To the physicians replying in the affirmative, blanks, following somewhat those of

the New York Committee, were sent to be filled out, one for each case, of which 234 have been received and analyzed. Although undoubtedly not all cases occurring in Massachusetts were reported, the data at hand may be taken as representative of conditions in the State, and it is fair to assume that most cases occurring find a place, and that the report may be taken as fairly representative of the occurrence of the disease in a State of 3,003,680 inhabitants living partly in cities and partly in the country.

The present report will deal with the data recorded in literature as to etiology, epidemic character, contagion, experimental production in animals, and then will be presented an analysis of the cases collected by the Board with especial reference to any light they may throw on the etiology of the affection or its clinical recognition. The group of cases presented differs somewhat from most material already collected, which is largely derived from the observation of late cases seen in hospital clinics, whereas these are acute cases reported by the attending physicians to whom the Board desires to express its obligation for their willing and efficient coöperation in the enquiry.

Proceeding first to the analysis of literature, the data are as follows:

BACTERIOLOGY.

The evidence in favor of the bacteriological source of the disease is as follows:

Scultze* in 1898 found a diplococcus in a lumbar puncture on the 13th day free in the spinal fluid; leucocytes were not present. A second puncture two days later was sterile.

Dercum† in a lumbar puncture found a micrococcus which in morphology and staining properties resembled the diplococcus of Sternberg.

* Münchener Med. Wch. 1898–38.

† Journal of Neu. and Ment. Dis. 1900–XXVII.

Spiller* found the staphylococcus pyogenes albus in cultures in the fluid from lumbar puncture in one case affected at the same time with small-pox.

Chapin† quotes Brooks as finding (1) a diplococcus in the anterior horns of the cord and not in the blood or meninges, and (2) a diplococcus in the blood during life.

Batten‡ found in the cerebro-spinal fluid (*a*) short difficult staining bacillus (probably proteus vulgaris), (*b*) a fat coccus like that from infected wounds, (*c*) the ordinary staphylococcus.

Huber§ on the third day identified in the fluid a diplococcus situated in the cells, typical of cerebro-spinal meningitis.

Engel‖ found staphylococcus albus, but the patient had also suppurating bone disease.

Barnes and Miller¶ identified the staphylococcus albus and pyogenes citreus in a case examined after death.

Bulow-Hansen and Harbitz** found in one case in a serumagar culture from the spinal fluid obtained post mortem a diplococcus or short double rod. Gram staining. This was not found in the sections of the cord; the organism was not virulent for animals, and seven other cultures were sterile.

Looft and Dethloff†† in two cases found a Gram-staining diplococcus which they identified with meningococcus type Heubner.

Geirsvold, Harbitz and Scheele‡‡ in 15 cases have found in the spinal fluid from lumbar puncture bean-shaped diplococci or tetrads growing in from 2 to 6 days on cultures.

* Brain. Autumn, 1903.
† Arch. of Pediatrics, Nov., 1900.
‡ Brain. 1904. 376.
§ Deutsch. Med. Wchsft. No. 12. '79.
‖ Prag. Med. Wchsft. 1900. No. 12. ¶ Brain. 1907.
** Norsk Mag. f. Läegevidenskaben. 1896. 11.
†† Medicinsk Revue. 18. 1901–321.
‡‡ Journal American Med. Assoc'n, Jan. 25, 1908.

They stained by Gram's method, except in old cultures where this was variable. They were virulent for animals, causing atrophy, paresis, emaciation and death.

Concetti* examined the fluid obtained by lumbar puncture in 9 cases of acute anterior poliomyelitis; in 2 cases the pneumococcus was present and in a third the meningococcus of Weichselbaum; the others were sterile.

Pasteur, Fullerton and Maccormac† found a diplococcus in the fluid withdrawn from an acute case which caused motor paralysis when inoculated into the subdural space of rabbits, but which could not be grown.

This represents all the positive evidence that it has been possible to find. A similar organism was found by Geiersvald in the throats of patients affected. The same coccus was, however, obtained from the throats of persons in localities where the disease had not appeared. On the other hand, most competent investigators have not found organisms in the spinal fluid during life or in the sections of the cord after death. Such findings are reported by Dauber, Goldscheider, Siemerling, Guinon Rist, and others.

Flexner‡ found that bacterial cultures both in aërobic and anaërobic media gave no results, and that the cerebro-spinal fluid was sterile, no inflammatory products being found in the fluid. The Mt. Sinai Hospital studies‡ showed only a moderate leucocytosis in a number of the cases, many bloods being normal.

Achard and Grenet,‡ in a fourteen-year-old child, found pronounced lymphocytosis in the cerebro-spinal fluid.

Frankel‡ and Niedner and Mamlock‡ found no such lymphocytosis.

That Anterior Poliomyelitis is an infectious disease is the commonly received opinion. Since it has been seen that it cannot be regarded as established by bacterial evi-

* Rev. mens. d. mal. de l'Infance. 1900, p. 550. † Lancet, Feb. 15, 1908
‡ Journal American Medical Assoc'n, Oct. 19, 1907, p. 1370.

dence so far collected, the other evidence in favor of this view will, therefore, be investigated.

The disease appears to be a pathological entity, but it must be remembered that it is possible that it merely represents the reaction of the spinal cord to various causes, such as sepsis, trauma, specific infectious diseases such as measles, chilling of the body, and over-exertion. When the antecedents of the attacks are analyzed in this series of cases, it will be seen that these points must be considered.

EPIDEMIC CHARACTER.

That the disease is at times epidemic is unquestioned, and established by ample evidence; nor are epidemics confined to any especial part of the world, to any one kind of climate, nor, so far as can be seen, to any especial environment.

Holt and Bartlett* have collected thirty-five (35) epidemics, prior to 1907, recorded in literature, and have analyzed them and given the literature in full. The principal epidemics are as follows:

France, near Lyons. 13 cases in town of 1,500.†

Italy, near Florence. 7 cases in 15 days. Another epidemic, 17 cases in 4 months.‡ 2 epidemics in Conegliano of 9 and 13 cases (Fabis).§

Germany. In a polyclinic, averaging from 2 to 3 cases, yearly, between 1892–1897, between May and December, 1898, there were 15 cases.‖

Austria. 42 cases in and near Vienna in summer of 1898.¶

* American Journal Med. Sci. May, 1908. 647.
† Cordier. Lyon Med. 1887.
‡ Piericanni and Bucelli. Quoted by Johanessen.
§ Fabis La Pediatria. May, 1901.
‖ Jahrb. f. Nervenheilkunde. 1899, i, 41.
¶ Zappert Jahrb. f. Kde. 1901, 125.

NORWAY and SWEDEN. In Stockholm from 1888–1895 there were from 3 to 11 cases a year. In 1895, 21 cases from March to October, inclusive.*

Leegard†: July to Oct., 45 cases (preceded by colds in 6 cases, exanthemata in 7, overexertion in 9. An epidemic of jaundice existed in 2 of the districts).

Medin.‡ 2 epidemics in Stockholm in 1887 and 1895; 43 and 21 cases, respectively. (Cf. Johanessen for description of latter.)

Rissler.§ 5 epidemic cases with description of their pathology.

Harbitz and Scheele‖ dealt at length with the prevalence of the disease in Norway. In 1905, there were 719 cases with 34 deaths; in 1906, 334 cases with 34 deaths. Thus in the two years, 1,053 cases with 145 deaths (13.8% mortality). Most cases were typical anterior poliomyelitis, but cases were seen of acute ascending paralysis, and some encephalitis, but no clear cases of cerebro-spinal meningitis.

Other epidemics in Norway and Sweden were reported by Bergenholz in Umea, in July, 1881.¶

AUSTRALIA. Alston** reported an epidemic of 14 cases in Fort Lincoln, South Australia, in March and April, 1895.

Wade†† reported an epidemic of 34 cases where pain was a prominent symptom, occurring in 28 of the 34 cases.

UNITED STATES. Epidemics from widely separated parts of the country have been reported.

* Johanessen. Festschft of Abraham Jacobi. 1900, p. 263.
† Leegard. Abst. in Neurol. Centralbl. 1902. xxi-505.
‡ Medin. Nord. Med. Arkiv. 1896.
§ Rissler. Nord. Med. Arkiv. 1888–22.
‖ Journal American Med. Assoc'n. Oct. 26, 1907, p. 1420.
¶ Medin. Nord. Med. Arkiv. 1896.
** Alston. Australasian Med. Gaz. April 24, 1897. 123.
†† Wade. Australasian Med. Gaz. July 24, 1904.

Newmark* reported 4 cases in a village of 49 inhabitants near San Francisco.

Bondurant and Woods† described 15 cases occurring in Alabama within a radius of 12 miles.

Colmer‡ reported an epidemic in West Feliciana, Louisiana.

Brackett§ investigated 10 cases occurring in North Adams, Mass., in 1894. (As a rule the cases were situated along one or two rivers flowing through the town. The bladder and rectum were affected in an unduly large proportion of the cases.)

J. M. Taylor‖ reported 7 cases occurring in Cherryfield, Maine.

Painter¶ described an epidemic in Gloucester, Mass., of 38 cases with one death. No common etiological factor was found.

An epidemic in Poughkeepsie, New York, was observed in the summer of 1901 by H. L. Taylor, of New York.**

One of the most extensive epidemics ever reported occurred in Rutland, Vermont, and was investigated by Caverly†† and McPhail,‡‡ where there occurred 132 cases in the summer of 1894 with 18 deaths. There was nothing in the climate, soil, locality, or class affected, to explain the distribution.

In New York city, in the summer of 1907, occurred the most severe and extensive epidemic ever reported.

A fact perhaps bearing on the etiology is found in the

* Medical News. Jan. 28, 1899.
† Bondurant. Medical News. Aug. 18, 1900.
‡ American Journal Med. Sci. 1843.
§ Trans. Am. Orth. Assoc'n. vol. xi, p. 132.
‖ J. M. Taylor. Phila. Med. Journal. Jan. 29, 1898.
¶ Boston Med. and Surg. Journal. Dec. 11, 1892, p. 633.
** Quoted by Painter.
†† N. Y. Med. Journal. 1894. Vol. 2.
‡‡ Brit. Med. Journal. 1894. Vol. 2, p. 1233.

affection of five dogs on the Labrador coast* in the autumn of 1907. The dogs were feeding on decomposed herring which was full of maggots, and were affected by a sudden paralysis, most marked in the hind legs; three died and two recovered. No post mortem examination was made.

These data establish the fact that the disease is at times clearly epidemic, but from these epidemics no definite data have been obtained to explain the etiology of the disease or the mode of infection. The statement is made by Leegard that in the epidemic observed by him the disease spread along the lines of most extensive travel. The statement is made by Norwegian authors that localities visited by an epidemic were comparatively immune for awhile.

CONTAGION.

Evidences of contagion or of a source of common infection, as from a milk supply, are not lacking and deserve consideration.

The conclusion of Geirsvold,† who investigated the Swedish epidemics, was that the disease was contagious, frequently several cases occurring in one family. This conclusion was concurred in by Harbitz and Scheele.

Holt and Bartlett, in their analysis of literature, found 40 instances in which more than one case of the disease occurred in a family or household. These were tabulated as follows:

Two cases in a family, 31 instances.
Three cases in a family, 5 instances.
Four cases in a family, 3 instances.
Seven‡ cases in a family, 1 instance.

* Personal communication by Dr. H. M. Hare of Harrington Hospital.

† Quoted by Harbitz and Scheele.

‡ Pasteur. Trans. Clin. Soc. of London. 1896; 143.
Buzzard. Lancet, 1907; pp. 705, 785, 865.

The intervals between the illness of the different patients were as follows:

Same day, or simultaneously,	8 instances.
Interval one day,	2 "
" two days,	1 instance.
" three days,	1 "
" four days,	5 instances.
" five "	2 "
" six "	2 "
" seven "	5 "
" eight "	2 "
" six weeks,	1 instance.

EXPERIMENTAL EVIDENCE.

As bearing on the fact that the disease may be of multifold origin, the following facts must be considered.

Stieglitz* experimented with lead poisoning in 36 animals and in one guinea-pig found characteristic changes with destruction of cells in the anterior cornua with cell infiltration. Paralysis was present and death occurred in 24 hours.

Vulpian † produced, experimentally, paralysis of the extensors and lesions resembling those of poliomyelitis in a dog by lead poisoning, and in a case of lead poisoning found pronounced poliomyelitis with colloid degeneration and cell atrophy.

Phillippe and Gauthard ‡ report a case of anterior poliomyelitis from lead poisoning, and Obrastoff § one from arsenical poisoning. Onuf ‖ reported the case of a painter with flaccid paralysis of both legs, in whom autopsy showed lesions characteristic of the disease.

Turning from this to experimental data bearing on the

* Journal of Nerv. and Ment. Dis. 1900. Vol. 27, p. 156.

† Maladies du Syst. Nerveuse. Paris. 1879.

‡ Neurol. Centralblt. 1903. XXXI–889.

§ Neurol. Centralblt. 1902 XXII–278.

‖ Journal of Nerv. and Mental Dis. 1900. XXVII. 155.

subject, it is recognized in laboratories that paralysis occurs at times in young rabbits not experimented on. It has been described in guinea-pigs* after the injection of toxin which has been only partially neutralized by antitoxin and very rarely after the injection of toxin alone, and in animals, especially rabbits, made septic, it frequently is seen.

Too much weight, therefore, cannot be attached to the following suggestive experiments.

Thoinot and Masselin † injected 43 rabbits in the marginal veins of the ear with a culture of the colon bacillus: 9 died of sub-acute general infection and lesions were found in the anterior cornua of the cord; 34 of the rabbits survived, and were all paralyzed in a period varying from 2 days to 6 months. The paralysis affected first and most the posterior limbs, extending in severe cases to the anterior. The paralysis at times was unilateral in its predominance. Diarrhœa was noted in all but three subjects, but the paralysis always recovered if the animal lived. In the cord congestive and hemorrhagic phenomena were noted with degeneration of the cells in the anterior cornua of the cord, the peripheral nerves were normal and the muscles atrophied. The same phenomena appeared in all but one of six survivors of a similar injection of a culture of the staphylococcus aureus in nineteen rabbits, of which eleven died. Similar phenomena were reported by Gibert and Lion ‡ from injection of the colon bacillus; by Bourges, from injection with the coccus of erysipelas, and by Vincent from injection of Eberth's and another bacillus, and by Charrin and Claude § by a pyocyaneus toxin.

Roger ‖ produced in rabbits a weakness of the limbs and muscular atrophy by the injection of a streptococcus of

* Lewis, Journ. Med. Research. XV-3.

† Revue de Med. 1894. 14. 449.

‡ Societé de Biol. 1892. Feb. 13.

§ Comptes Rend. de l'Acad. des Sciences. 1897-1133.

‖ Ann. de l'Inst. Pasteur. 1892. VI. 437.

moderate virulence with degeneration of cells in the anterior cornua.

Hoche* injected into the lumbar arteries of dogs aseptic pollen and other finely divided granules, with the result of producing in the spinal cord lesions much like those of infantile paralysis in certain respects, embolic softening or infarcts resulting.

It would seem justifiable to sum up the evidence as follows: The positive bacterial findings are not convincing, only a few such being reported and these not always agreeing as to the organism, whereas a very great number of cases are examined by lumbar puncture with negative results. But negative results do not disprove a bacterial origin for the disease, for the organisms may do their work and disappear or the harm may be done by toxines and not by the bacteria themselves. If one cannot accept the positive evidence as convincing, one must also remember the true value of the negative evidence in this connection. The injection experiments do prove, however, that certain metallic poisons, bacteria and toxines have a selective action on the motor cells of the anterior cornua when present in the general circulation, that the paralysis of this type may be largely unilateral, that the posterior limbs are always more affected than the anterior, and that the lesions in the cord in such cases do not differ essentially from those of anterior poliomyelitis.

The data from the study of the 234 cases in this series will next be taken up for consideration.

DISTRIBUTION.

It became evident on grouping the cases that certain foci at widely separated parts of the State had existed. One occurred in Pittsfield, in the western part of the State, a city of 25,700 inhabitants (with 18 cases), and north and

* Arch. f. Psych. 1899. XXXII. 209.

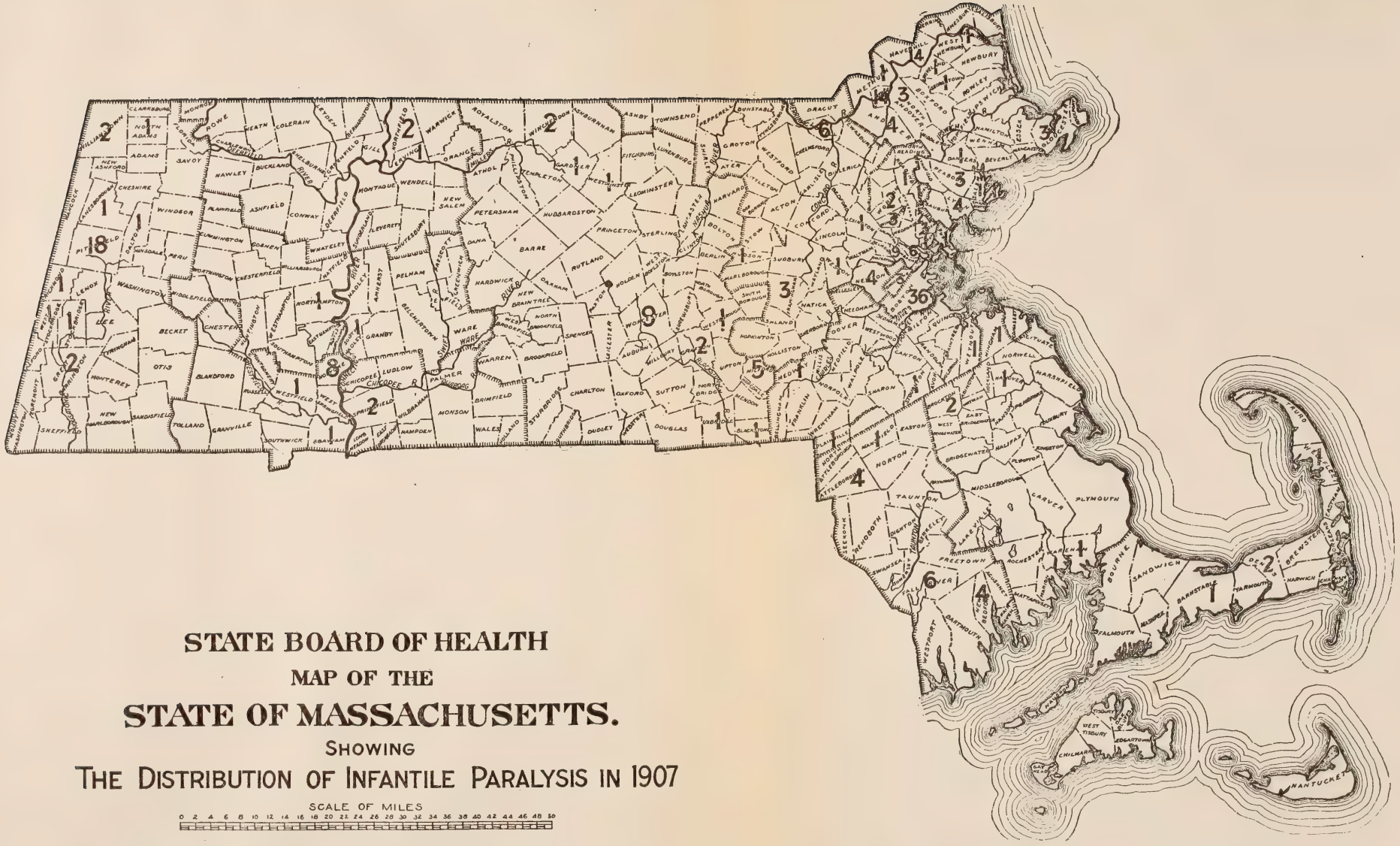
south of Pittsfield, along the lines of trolley travel, which is here extensive, appeared other cases in the adjoining towns. It did not spread east and west, in which directions the trolleys do not run. Of course, the trolley lines run in the most thickly populated regions, and the disease would naturally spread in the directions where most people were to be found. Still, it may be said, as in a Swedish epidemic, that the spread of the disease followed the lines of most extensive travel. There were no other cases reported in the western part of the State except those directly adjacent to Pittsfield. Coming east through an agricultural country, there were no more cases reported until the valley of the Connecticut River was reached, where there were a few cases along the valley in the adjacent cities of Springfield, Holyoke, and Northampton and South Hadley Falls, where in an aggregate population of about 127,000 there were 12 cases.

Another obvious centre of the disease was to be found in the group of adjacent towns in the valley of the Merrimac River, consisting of Lawrence, Haverhill, Georgetown and Andover, where, in an aggregate population of about 117,000, there were 36 cases, a prevalence much less than in Pittsfield, but much more than in the Connecticut Valley.

Boston, with 609,761 inhabitants, reported only 36 cases, and the remainder of the cases were to be found in various parts of the State, mostly in the eastern part, but practically always in contiguous towns; that is, it was rare to find even one case in a town without finding a case in one or more adjacent towns.

Distribution of cases of infantile paralysis in Massachusetts in 1907.

Agawam		1	Blackstone		1	Roxbury	7
Andover	3		Boston	15		S. Boston	5
W. Andover	1		Charlestown	1			— 36
	—	4	Dorchester	5		Brockton	2
Attleborough		4	E. Boston	2		Brookline	3
Barnstable		1	Jam. Plain	1		Cambridge	9



STATE BOARD OF HEALTH

MAP OF THE

STATE OF MASSACHUSETTS.

SHOWING

THE DISTRIBUTION OF INFANTILE PARALYSIS IN 1907

SCALE OF MILES

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50

Chatham (West)	1	Lanesborough	1	Richmond	1
Chelsea	1	Lawrence	14	Salem	1
Dalton	1	Lexington	1	Somerville 4	
Danvers	1	Lowell	6	W. Somerville 2	
Dennis	2	Lynn	4	—	6
Erving	1	Malden	3	Springfield	2
Fall River	6	Mansfield	1	So. Hadley Falls	1
(Case No. 74, Tiverton, R. I.)		Marblehead	1	Stockbridge	1
		Medway	1	Stoughton	1
Framingham 1		Melrose	2	Uxbridge	1
S. Framingham 2		Methuen	1	Wakefield	1
—	3	Milford	5	Wareham	1
Gardner	1	New Bedford	4	Wellfleet	1
Georgetown	1	Newburyport	1	Westborough	1
Gloucester	3	Newton 1		Westfield	1
Grafton 1		Chestnut Hill 2		Westminster	1
N. Grafton 1		N. Upper Falls 1		Weston	1
—	2	—	4	West Stockbridge	1
Great Barrington	2	North Adams	1	Weymouth (East)	1
Groveland	1	North Andover	3	Williamstown	2
Hanover (West)	1	Northfield (East)	2	Winchendon	2
Haverhill 12		Northampton	1	Winchester	3
Bradford 2		Peabody	3	Winthrop	1
—	14	Pittsfield	18	Woburn	2
Hingham	1	Plainville	1	Worcester	9
Holyoke	8	Reading	1		
Hudson	1	Revere	1		

56 of the 234 cases (24%) occurred in towns of less than 10,000 inhabitants, and 25% of the inhabitants of the State live in towns of less than 10,000 inhabitants. The disease cannot therefore from these figures be regarded as attacking especially the inhabitants of the cities.

This evidence tends rather towards supporting the contagious character of the disease, as established by its uneven distribution, extending from foci and not evenly scattered through the State; by its extension from Pittsfield along the lines of most frequent travel, and by the fact that there was rarely a case in one town without the occurrence of a case in the adjacent town or towns.

Following up still further the evidence of contagion: other cases in the family were reported in 11 instances; other cases in the same house in 9 other instances; other cases among acquaintances in 20 instances. That is, in 40

cases (17%) there was reason to look into the question of contagion.

The histories pointing to contagion were then analyzed. A child of 3½ was affected, followed 11 days later by the father (reported by Dr. Pitcher of Haverhill). Two brothers were affected at an interval of two days (Dr. Hubbard of Holyoke). Two brothers were affected with an interval of two days (Dr. Philbrick of Northfield). Two brothers were affected, interval not stated (Memorial Hospital, Worcester). Two brothers were affected at an interval of ten days (Dr. Boland of South Boston).

Going outside of the family there were other suggestions to the same effect. Dr. Hubbard of Holyoke reported one case followed by another six days later in a playmate. Dr. Croston of Haverhill reported a case which was followed by the similar affection in a playmate five days later. Dr. Hayes of South Boston reported two cases occurring in playmates "at about the same time." Dr. Kelley of North Attleboro' reported a similar case in two children living opposite each other on the same street. In seven cases the statement was simply made that similar cases had occurred among patients' acquaintances.

In one instance a patient in the second house from the patient was affected, and in another there were said to be two other cases on the same street.

The inquiry as to other illness in the family at the time brought out the fact that in several instances febrile disturbances existed in other children in the same families, a matter which is of interest and has been noted in certain epidemics reported. Such febrile attacks have been regarded as abortive cases (Bulow-Hansen, Buzzard, Harbitz and Pasteur).

TRAUMATISM.

The frequency with which a traumatic history was given as preceding the attack was then analyzed. In 52 of the

234 cases such a history was given. A further analysis showed that in 3 of these cases the stumbling was probably connected with the attack. In 5 the history was not satisfactory or was too indefinite. In 9 the accident had occurred a month or more before the attack. Throwing out these cases, there remained 35 cases where a clear history of accident preceded the attack, generally within a few days of the onset. These accidents were both slight and severe; falling out of bed or from a chair, falling from a bicycle or wagon, blows on the head, falling down stairs, etc., formed the bulk of the histories, but in most instances where it was mentioned it was stated that the child fell on the head.

Skeptical as one may be about the value of traumatic histories, it must be remembered that these histories are not from the hospital class, that they are obtained from the family physicians who have reported the cases individually, and that they must be allowed considerable weight.

In 2 cases the child received a severe fright before the attack. In 4 a chill from falling into water was attributed as the cause. In 3 over exertion was thought to have been the cause.

REASON OF ONSET.

The disease is well recognized as one that attacks children in the first dentition, and as one that prevails in the late summer and early fall. In this it offers a striking resemblance to the prevalence of the gastro-intestinal diseases of children which affect children of the same age at much the same time of year.

As to age, the largest number of cases occurred between 1 and 2 as is always the case, 47 cases occurring in this year, and from then on the number of cases fell with more or less regularity to reach a level of from 1 to 3 each year after puberty was reached. There were 131 males and 103 females affected.

The greatest prevalence of the disease in these cases was in September, and the least from January to June inclusive. From July it rose to reach its height in September, and fell through October, November and December.

MONTH OF ONSET OF INFANTILE PARALYSIS.

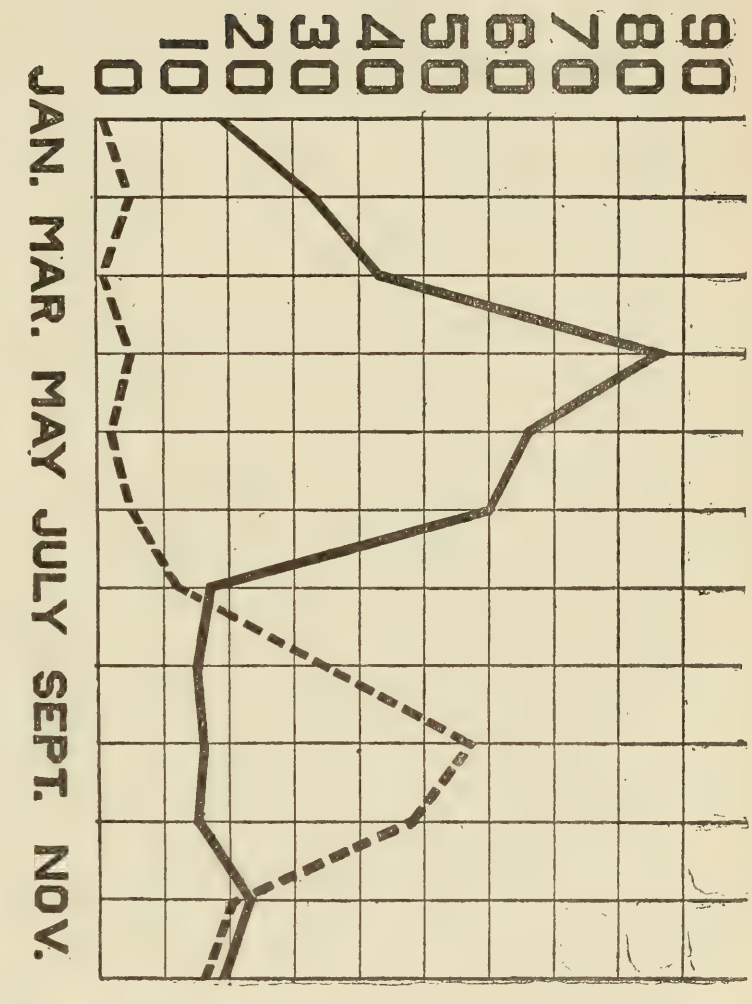
January	1	September	57
February	5	October	48
March	1	November	21
April	5	December	16
May	2	Not stated	29
June	4		
July	12		234
August	33		

OF CEREBRO-SPINAL PARALYSIS.

January	19	July	17
February	33	August	15
March	43	September	16
April	86	October	15
May	66	November	23
June	60	December	19

The cases of cerebro-spinal meningitis occurring in Massachusetts in the year 1907 (412 in number) were then analyzed to see how the seasonal occurrence of that disease corresponded to the prevalence of infantile paralysis. In cerebro-spinal meningitis the largest number of cases occurred in April, and the smallest number in August, September and October. As the relation of the two diseases has been discussed of late, some authors regarding them as practically variations of the same essential disease, it may be said that if the two have a relation of seasonal occurrence it is that infantile paralysis largely replaces cerebro-spinal meningitis during certain months.

The close correspondence between the age and season of occurrence of this affection, and that of the gastro-intestinal diseases, suggests the intestines as a source of infection possible from some bacillus contained in milk. In 201 instances where the question was answered, in 152 the patient was a



DISTRIBUTION OF 234 CASES OF INFANTILE PARALYSIS ------
" " 412 " " " CEREBRO-SPINAL MENINGITIS } ——
BY MONTHS (MEAN IN 1907)

consumer of raw cow's milk and in 49 was not. That is, two-thirds of the patients reported on might have received their infection in this way, and the others undoubtedly were to some extent consumers of milk; on the other hand, it must be remembered that Geirsvold found in the throats of patients with infantile paralysis, a diplococcus resembling that found in the spinal fluid, but in this connection it must also be remembered that this is not an unusual state of affairs in patients without anterior poliomyelitis.

Taking up other factors in the history bearing on etiology, investigation as to race and nativity showed nothing of importance.

The reports on the conditions of the house in which they lived are of interest. 115 lived in detached houses; 110 in tenements.

As to the influence of dampness, 99 lived on the first floor, 65 on the second, 12 on the third, and 6 in the upper stories; 20 occupied the whole house.

Sanitary conditions were described as exceptionally good in 21. Good, in 123. Fair, in 55. Poor or bad, in 23.

The location of the dwelling was given as high and dry in 141. Damp or low or both in 76. "Medium" in 7.

Mosquitoes were reported as prevalent in 57 cases, and not prevalent in 156. Flies were prevalent in 90, not prevalent in 116. The house was screened in 133 cases, and not screened or insufficiently so in 80.

Analyzing these data for what they are worth, it would seem that it was not an affection confined to the lower classes, as shown by the simple fact that 133 out of 212 cases reported had their windows screened, which is an evidence of a fair amount of comfort. It did not affect the dwellers in tenements as often as it did those living in detached houses. That dampness may be a factor of possible importance is indicated by the fact that 99 out of 202 reported on lived on the lower floor, and that in 76 out of 224

cases the dwelling was low or damp. It would not seem probable that 49 per cent. of the population of the State lived on the lower floor or that 34 per cent. of the population lived in low or damp localities. It would seem, therefore, fair to assume that dampness was possibly a predisposing factor.

An enquiry as to whether any special disease was prevalent at the time in the locality elicited nothing of importance, and no instances of disease in the domestic animals of the family were found, except in one case—distemper in a dog.

CONDITIONS PRECEDING ONSET.

Various degrees of illness preceded the attack, malaise, headache and loss of appetite being the most frequent signs. This frequently preceded the attack for two or three days. The exanthemata had apparently some influence. Twice varicella occurred just before the onset, twice the paralysis occurred in the convalescence from measles, and once a rash thought to be scarlet fever preceded the attack. The presence of a possible source of septic absorption was shown once in the existence of an abscess behind the ear, once in chronic otorrhœa, once in a child vaccinated two weeks and once in a child vaccinated three weeks previously.

The degree of fever during the onset was as follows:

DEGREE OF ACCOMPANYING FEVER.

No fever	12	
"Fever"	75	(High, 8; moderate, 8.)
Temp. 100	6	
" 101	15	
" 102	33	
" 103	28	
" 104	14	
" 105	6	
Not noted	3	

Other symptoms in the attack were as follows:

SYMPTOMS ACCOMPANYING ATTACK.

	Present.	*Absent.*	*Not Noted.*
Vomiting	125	64	45
Brain symptoms	54	65	115
Retraction of head	64	84	86
Pain or tenderness, during or after attack	126	78	30
Digestive disorders	80	47	107
Disturbance of bladder function	42	158	34
Disturbance of function of rectum	44	152	38

The frequent occurrence of pain and sensitiveness during or after the acute attack is emphasized in this series, and is not sufficiently recognized in general frequently leading to errors in diagnosis. That it was present in 61% of all cases noted means that it is a symptom to be expected and remembered.

The duration of the acute attack was as follows:

DURATION OF ACUTE ATTACK.

1 day or less	10 cases	6 days	9 cases
2 days	19 "	1 week	21 "
3 days	23 "	1–2 weeks	33 "
4 days	17 "	2–3 weeks	23 "
5 days	13 "		

(A few longer durations are given.)

RELATION OF BEGINNING OF PARALYSIS TO ONSET OF FEVER.

Paralysis preceded the attack in 2 cases.

It occurred immediately after in	30 cases
within 12 hours	10 "
within 24 hours	20 "
within 48 hours	25 "
within 3 days	28 "
within 4 days	21 "
In from 4 to 7 days	34 "

(A few longer intervals are given.)

DISTRIBUTION OF PARALYSIS.

The distribution of the paralysis when at its worst was as follows:

		Late cases from Children's Hospital Series.
R. Lower Extremity	30	216
L. Lower Extremity	31	239
Both Lower Extremities	41	130
R. Arm	3	5
L. Arm	14	5
Both Arms	3	0
R. Arm, L. Leg	8	5
R. Arm, R. Leg	11	7
L. Arm, L. Leg	16	8
L. Arm, R. Leg	1	2
Both Arms, R. Leg	0	0
Both Arms, L. Leg	2	0
R. Arm, Both Legs	4	1
L. Arm, Both Legs	11	1
Both Arms, Both Legs	23	3
Back (In connection with other Paralysis)	40	—
Abdomen (In connection with other Paralysis)	19	—
Face (In connection with other Paralysis)	15	—
Not noted	28	

For purposes of comparison a table is given of 635 late cases reported from the orthopedic clinic of the Children's Hospital, Boston,* showing how much less extensive is the late distribution of the paralysis than is the early distribution. It is a matter of common information that a period of spontaneous improvement follows almost directly on the onset. This period lasts from two months upward, during which the paralysis limits itself most often to one or two members, generally to the lower extremity.

It is to be regretted that in the present series of cases the notes of the final condition were not sufficiently full to enable us to make a table of the end results.

A fact of interest, not recognized at any rate by the orthopedic surgeons, who from seeing late cases have come to

* Report not yet published.

the conclusion that permanent and complete recovery from the disease is at least very rare, is found in this series of cases which indicate that complete recovery is not unusual and 18 well authenticated cases of what appears to have been complete recovery of muscular power have been reported.

The paralysis in these cases was located as follows:

Both lower extremities,	4
One lower extremity,	5
Arm and leg, same side,	2
Hemiplegic distribution,	2
One arm,	3
General slight paralysis,	2

The time given for recovery varied quite evenly from 2–12 weeks, but two cases of recovery in from 24–48 hours were given. These were as follows:

Dr. Palmer, of South Framingham, reported a case six months old, where a total paralysis of the left arm followed 24 hours after an attack of fever. The loss of power lasted 24 hours and wholly disappeared.

Dr. Philbrick, of East Northfield, observed a child three years old attacked by fever of 101, retraction of the head, and twitching of the face, and the attack was followed immediately by some paralysis of both arms and legs. Recovery followed in 48 hours. The treatment consisted of free catharsis.

The tabulation of the time of recovery was as follows:

24 hours	1	2 months	3
24-48 hours	1	2½ months	2
2 weeks	2	3 months	3
3 weeks	1	Gradual	1
1 month	2		—
6 weeks	1	Total	18
7 weeks	1		

There seems no reason to doubt the authenticity of these cases; on the whole the histories suggest that they were to be classed among the less severe cases, but such

histories as the following were not unusual. Case No. 105. (Dr. Hubbard, of Holyoke.) Temperature, 103. Vomiting. Brain symptoms. Retraction of the head. Pain in the left leg. Digestive disturbance. Paralysis of the left leg and thigh. Complete recovery in six weeks.

If such cases as this are not true anterior poliomyelitis, they certainly resemble it sufficiently to warrant the statement that cases of considerable severity, not to be distinguished from anterior poliomyelitis, may recover entirely or apparently so in a few weeks, a course quite in accord with the experimental paralysis produced in animals above alluded to.

Death occurred in eleven cases; once there was a complicating pneumonia, four times the fatal result was apparently due to an involvement of the respiratory muscles by the paralysis, once was death preceded by a temperature of 105 and delirium. There was no information obtained in any case by autopsy.

The examination of the urine showed nothing of importance, 63 out of 66 urines examined being reported as normal or showing only evidences of febrile disturbance, while three contained albumen.

The Examination of the Blood was reported in eleven cases, nine being normal, one showing a "low color index" and one having a leucocytosis associated with a complicating lobar pneumonia.

SUMMARY.

The evidence as to the etiology of the disease may be summed up as follows: The sudden febrile onset and the character of the onset suggest infection, and there is a general impression that the disease is infectious, but the case is not proved by positive bacteriological data so far collected and most bacteriological examinations are negative, But

in this case negative evidence does not disprove the theory of infection, for the organism present, if one exists, may liberate a toxine and disappear.

The seasonal occurrence, the age of the children selected most commonly, and the frequent association of intestinal disturbance with the onset, suggest some intestinal infection as the possible source of the disturbance. It must be remembered that the disease follows the curve of summer diarrhœa as to age and season and follows the curve of cerebro-spinal meningitis as to neither.

From the evidence at our disposal it seems reasonable to suspect that some bacillus, probably an anaërobic one, reaches the intestines in milk and there liberates a toxine which is absorbed and carried to the spinal cells by the blood current. Hence the findings in the cerebro-spinal fluid withdrawn by lumbar puncture are negative in most cases.

But it cannot be regarded as certain that infantile paralysis is always caused by the same organism nor even that it is a pathological entity. It may be simply the clinical expression of the reaction of the spinal cord to one of several causes of which infection may well be one. A similar pathological condition has been seen to arise from lead poisoning from the experimental injection of bacteria in rabbits and from the injection of toxin in guinea pigs. Allowance must also be made for the possible influence, as shown in this report, of traumatism, dampness, over fatigue, the exanthemata and foci of pyogenic infection, as possible causes of infantile paralysis or a disease indistinguishable from it. At present we must observe and study and collect material, remembering that we may be dealing (1) with a specific infectious disease, (2) with an infection due to one of several organisms, or (3) with a disease of more than one origin not always necessarily infectious.

As to contagion, the data contained in this report are

not sufficient to establish this characteristic, although the distribution of the disease, its spread from foci, the involvement of contiguous towns, the spread along lines of most frequent travel, and the very suggestive histories given here, may well warrant us in suspecting it and collecting further data, and no harm could arise from the isolation of such cases from other children during the acute attack.

DISCUSSION.

Dr. J. J. Putnam, of Boston: What I would say is rather to emphasize the importance of taking up systematically the study of this matter than to dwell upon facts which we have already discovered. Dr. Lovett went over those points, telling you what had been done in the way of discovering the cause of the disease, and what we might hope for in the future. He left it a little uncertain whether it might not, after all, be the sensitiveness of the gray matter of the spinal cord, the cellular matter, rather than the particular character of the poison which was responsible for the result. In other words, he produced evidence to show that the anterior gray matter represents such a sensitive area that anyone of a variety of poisons will cause disease to arise there. He called attention to the fact that lead poisoning may give rise to muscular atrophy of spinal origin, and that similar conditions are seen in progressive muscular atrophy and other primary disorders of that sort of which we do not know the origin. That is undoubtedly true, and it is an important point, and it may be that we shall not find any definite poison or definite bacterium as the exclusive cause of poliomyelitis. Nevertheless, I hope that that will not prove to be the case. The very extraordinary tendency which the disease shows to appear during the late summer and early autumn months is in favor of the view that there is something definitely specific about its cause, and the same conclusion is derivable from the fact that as a rule only one case here and there out of a large population is affected. No doubt the anterior horns, like the peripheral nerves, represent tissues that are sensitive to many poisons, as well

as to the influence of fatigue, and perhaps there is more than one form of disorder now classified as poliomyelitis. Certainly the symptoms vary greatly. This fact is brought out by the history of the present epidemic as well as of those that have preceded it, such as that reported many years ago by Dr. Caverly of Rutland. The symptoms range from those of meningitis to those of neuritis, showing that different parts of the nervous system may be affected through this same poison, and that, I think, would hardly happen to the same extent, except with a poison of bacterial origin.

These are problems for the future to resolve, and they are problems which we should all bend our energies to investigate.

ARTICLE VII.

THE USE OF FRESH ANIMAL SERA IN HEMORRHAGIC CONDITIONS.

By TIMOTHY LEARY, M.D.
OF BOSTON.

READ JUNE 9, 1908.

THE USE OF FRESH ANIMAL SERA IN HEMORRHAGIC CONDITIONS.*

It is my purpose to present in this paper only a preliminary communication, dealing with the *practical* value of fresh animal sera in the treatment of hemorrhagic conditions.

It was early recognized by physiologists that the contact of blood with fresh serum or tissue juices hastened coagulation.

Alexander Schmidt in his classical experiments satisfied himself that during coagulation an excess of fibrin ferment was set free and was contained in the serum after separation of the clot. More recent experiments have demonstrated that coagulation is a more complex phenomenon than Schmidt found it, but the essential fact, that blood serum contains an agent which promotes coagulation, remains.

Kohler (1) in 1877 showed that the filtrate obtained after mincing a freshly formed clot, if injected intravenously, in quantity, into the animal from which the blood was originally drawn, would cause death from pulmonary thrombosis.

The practical application of these findings is due to the work of P. Emile Weil (2, 7) who, while studying hemophilia, began the use of fresh animal sera injected either intravenously or subcutaneously, as a means of controlling or preventing hemorrhage. Weil's work brought out these facts: that the blood serum of horses, rabbits and beef creatures, as well as human serum, had the power of controlling hemorrhagic processes by increasing the coagulability of the

* From the Laboratories of Pathology and Bacteriology, Tufts College Medical School.

blood; that beef serum was too toxic for ordinary use; that the serum used should be less than two weeks old; that a dose of 15 c.c. intravenously or 30 c.c. subcutaneously would obtain results in most cases; that the use of serum locally at the point of hemorrhage favored clotting; that the increased coagulability of the blood persisted for a period of from 15 days to several weeks. His studies in hemophilia satisfied him that in the hereditary type of the disease the results were at the best temporary; that repeated injections were necessary to control hemorrhages; that the massive type of visceral hemorrhages was controlled only imperfectly; that the greatest value of the treatment lay in the prophylactic injection of serum before operative procedures were practised.

In sporadic hemophilia and acute purpura, on the other hand, the results were permanent, definite cures usually being obtained.

In chronic purpura and pernicious anemia the effect of injections was only transitory.

OTHER MEANS OF CONTROLLING HEMORRHAGE.

Salts of calcium have been used as a means of increasing the coagulability of the blood since the work of Arthus and Pages. Wright met with almost uniform success in the treatment of nine hemophilic families, through the use of calcium salts, fibrin ferment and CO_2.

Robertson, Illman and Duncan (9) using calcium salts in other hemorrhagic conditions were unable to confirm Wright's results either with reference to the shortening of the coagulation time of controlling of hemorrhage.

CHOICE OF SERUM.

Weil recommends horse, rabbit or human serum.

We have made use of rabbit serum wholly, in the series of cases to be detailed later.

Rabbits are easily obtained, are readily kept, are subject

to fewer diseases than the horse, and are particularly free from tetanus.

Some years ago, while working on antisera from a medico-legal standpoint, we found that it was possible to obtain aseptically by cardiac puncture large quantities of serum without seriously disturbing the animal. We have therefore made use of this procedure in obtaining fresh serum for use in hemorrhagic conditions. The chest is shaved over the sternum and left side. With an ordinary antitoxin needle a puncture is made to the left of the sternum and about 1 cm. above a line drawn transversely at the junction of sternum and xyphoid. The needle is thrust toward the middle line and slightly upward. The puncture usually penetrates the left ventricle. Blood to the amount of 30 c.c. is slowly withdrawn. With large animals a relatively long needle is essential. As ordinarily practised, the withdrawal of blood is followed by no evidence of disturbance on the part of the animal. At most a temporary weakness follows. Animals which have been bled are in condition to be bled again within a period of two to three weeks. If the needle penetrates the auricles of great vessels at the base, death ensues rapidly from hemopericardium, but this is a rare accident after the development of a satisfactory technique.

The blood is collected in sterile centrifuge tubes into which have been poured 1 to 2 c.c. of fresh serum to favor clotting. After a short stay in the thermostat the clot is separated with a platinum needle, and the material is shaken in a centrifuge (electrical, 1800 to 2000 revolutions) for ten minutes. The serum is drawn off and is ready for use.

It is possible by following this technique to introduce the serum into a patient within two hours after its withdrawal from the vessels of the rabbit.

USE OF DIPHTHERIA ANTITOXIN.

Diphtheria antitoxin has had a limited use both here and abroad in the control of hemorrhage. Weil used freshly

prepared antitoxin in his early work. The serum, however, should be less than two weeks old when used. Dr. Theobald Smith informs me that the diphtheria antitoxin furnished by the State Laboratary is from six weeks to six months old before it is delivered. The serum is kept at least six weeks in order that the animals from which it is obtained can be watched for evidence of disease, and notably for tetanus. The demand for antitoxin is largely limited to the winter months, and it is the custom, for reasons of economy, to prepare serum during the summer months to help supply the enormous demand during the winter period.

I am informed that commercial anti-sera are subject to the same objections.

CHOICE OF METHODS.

Weil recommends the use of 15 c.c. of fresh serum intravenously, or of 30 c.c. subcutaneously. The subcutaneous route is the more desirable, since the danger of hemolysis or thrombosis following injection into veins (although remote) is to be considered. We believe that the intravenous use should be limited to extreme cases, where *immediate* results are required, or where human serum is used.

That the dissolving of red cells (hemolysis) is not a serious or even a considerable danger following *subcutaneous* use, is indicated by the following experiment.

Fresh rabbit serum is more markedly hemolytic for guinea-pig red cells than for human red cells in the test tube. This we have demonstrated repeatedly. It is a reasonable presumption, then, that rabbit serum would give rise to more marked hemolysis in guinea pigs than in human beings. One c.c. of rabbit serum was injected daily for 10 days into a 750 grm. guinea pig whose red cells at the beginning of the experiment numbered 5,000,000 per cubic m.m. Repeated counts made within a few hours after each injection showed no more variation than would ordinarily appear in repeated blood counts on the same individual (5,000,000

to 5,500,000). This dose (1 c.c.) of serum in a 750 grm. pig represents about 6 times the relative daily dose (15 c.c.) of rabbit serum which we have used subcutaneously in human beings. It would seem, then, that since these large doses of rabbit serum were incapable of invoking hemolysis in an animal more susceptible than man, the possibility of producing hemolysis in human beings may be ignored for practical purposes. It may be said here that in none of our cases did any evidence of hemolysis appear.

The toxic action of animal sera upon experimental animals has been the subject of much work. Beef serum is notably toxic in experimental animals, producing marked swellings at the point of injection, general malaise, rigors, fever and cyanosis, and in large doses leading to death. In human beings similarly toxic, though not fatal, results have been noticed.

Sheep and goat sera are also toxic for human beings, giving rise to local swellings of some moment. Horse serum and rabbit serum are but slightly toxic in this sense, being readily and rapidly absorbed without marked local reaction in most cases.

Serum sickness. Following the use of horse serum in the form of diphtheria antitoxin, there appears in a small percentage of cases the group of symptoms known as serum sickness. The symptoms are local œdema, urticarias and arthralgias. This train of symptoms follows the first injection, appearing usually on the fourth or fifth day, or later—or may appear following a second series of injections.

Anaphylaxis. More serious are the symptoms arising when a second injection, or series of injections, is made after an appreciable interval (10 days) has elasped since the first injection. Sudden dyspnœa, cyanosis and death may ensue. This condition, rare in man, has been carefully studied in guinea pigs, in which animals the reaction is constant. It is believed to be due to an increased sensibility to the toxic

principles of the foreign serum—due to a sensitization of the body cells by a substance present in the initial dose or doses. The process of sensitization is known as anaphylaxis, and Gay and Southard (15) believe it to be due to a specific substance present in the proteids of the foreign serum, which they call anaphylactin. It should be clearly kept in mind that this phenomenon is exhibited only when a second injection or series of injections follows the first at an interval of at least ten days. Repeated injections, without the interval of ten days, are unattended by danger.

Serious results of anaphylaxis in human beings appear very infrequently. Rosemau and Anderson were able to collect nineteen cases of sudden death from the literature, and state that they have personal knowledge of several more. In New York City it is estimated by Bolduan (16) that one death occurs in 25,000 persons injected. In this city, at the Children's Hospital, it is the custom, as indeed it is elsewhere, to repeat a prophylactic dose of diphtheria antitoxin every three weeks (an ideal time for the exhibition of anaphylaxis) during the stay of a child in the hospital, and no bad results have occurred. Maragliano's serum for tuberculosis is used at considerable intervals and no bad results are reported.

It has been claimed (Otto) that anaphylaxis more frequently followed the use of fresh than of old serum. Rosenau and Anderson (unpublished communication, American Association Pathologists and Bacteriologists, 1908) find no difference in the reaction to fresh or old sera. The anaphylactic agent is a stable body which does not change as the serum ages.

From our standpoint the danger of anaphylaxis is slight, since in most cases the serum is used only at one time, *i. e.* during the period of hemorrhage. In cases where the hemorrhages are repeated it is necessary to repeat the injections, and here the possibility of anaphylaxis must be

met. In one such case associated with menstruation, we supplied for the second injection guinea pig serum. This case has since had a transfusion and is at present well, in the interval between the menstrual periods.

We have had no evidence of toxic action, other than one case of urticaria, in our series.

CASES.

We have furnished serum for 20 cases, in 15 of which hemorrhages had already appeared. In the remaining 5 it was used as a prophylactic agent.

A—Jaundice.

In the surgicial clinics at the Carney Hospital (services of Drs. Munro and Bottomley) eight cases have received injections of rabbit serum. I am indebted to Dr. S. W. Goddard for the histories. The first case, in which the serum was exhibited only after hemorrhage has been going on for some hours, illustrates the rapidly fatal type on cholemic hemorrhage, which led William Mayo to say that no case of cholemic purpura had ever been successfully operated upon.

I. L. P., 48 years of age, had a stricture of the common duct following cholecystectomy 5 months ago. Had been jaundiced 3 months, with clay colored stools. Operation, hepatico-duodenostomy, was followed by internal hemorrhage and hemorrhage from wound. 15 c.c. of rabbit serum was introduced subcutaneously 24 hours later, when there had been tangible evidence of internal hemorrhage for 10 hours, and patient was sinking rapidly. Death from hemorrhage five hours after the first dose of serum. If we were dealing with this case to-day I think that we could save it. The serum would have been used earlier and in larger dose, and a gause packing soaked in serum would have been introduced locally.

The other cases in this series received 30 c.c. of rabbit serum subcutaneously from 24 to 72 hours before operation, *as a prophylactic measure.*

II. A. R., female, 49. Chronic Pancreatitis with Stricture of Hepatic Ducts. Has had fleeting jaundice following attacks which began 17 months ago. Jaundice *with purpura* for past week. Operation (choledochostomy) was followed by no bleeding. Purpura rapidly cleared up.

III. C. F., female, 53. Gall-stones. Deep jaundice *with purpura* persisting for 3½ months. Operation (choledochostomy) followed by no bleeding.

IV. E. J. 30. Female. Gall-stones. Symptoms for one year. 5-6 attacks. Jaundice, deep, for two weeks, with clay colored stools. Operation (cholecystostomy, choledochostomy) was followed by slight bleeding from wound four days later. 15 c.c. of serum was injected. The seventh day the discharge of bile from the fistula ceased and more blood appeared. The eighth day a spurting vessel was found in the wound, which had given rise to much hemorrhage. This was tied. From this time there was little or no bleeding. Death ensued on the eleventh day from cholemia. In this case the cholemia was reëstablished, probably through inflammatory obliteration of the duct, and death ensued from this cause. The inability of any agency to permanently control cholèmic hemorrhage, unless the cause is removed, is illustrated by this case.

V. N. M. 45. Female. Gall-stones. Chronic Pancreatitis. Symptoms of gall-stones for two years. Jaundice persistent for nearly two years. At present deep jaundice. No purpura. Operation (cholecystosmy, choledochostomy) followed by no hemorrhage.

VI. E. W. 49. Male. Gall-stone. Cholecystitis. Four typical gall-stone attacks with several milder seizures during past two yeafs. Some with jaundice which was mild and not permanent. Last attack 5 days ago, with jaundice (mild). Operation (cholecystostomy) followed by no hemorrhage.

VII. H. K. 65. Female. Gall-stones with Atrophy of Gall Bladder. Acute attack with jaundice for 3 days. Two large stones found in common duct. Operation (choledo chostomy with cholecystectomy) followed by no hemorrhage.

VIII. E. K. 39. Female. Cancer of Gall Bladder and Liver. Moderate jaundice for two months. No purpura. Operation (exploratory) followed by no bleeding.

IX. Drs. Wm. G. Bolles and Wm. H. Robey, Jr. History by Dr. Robey. N. M. G. 34. Female. Always in good health. One year ago while in Vermont an attack of epigastric pain with vomiting, no jaundice, lasting about three weeks. Middle of February, second attack without jaundice. Never well since. More violent attack about March 15. Operation, March 30, 1908; one large gall stone completely closing common duct. One week later, secondary hemorrhage. Packing wound with gauze wet with adrenalin and injecting adrenalin into wound through drainage tube, failed to stop hemorrhage. Patient very sick with gradually rising pulse. Jaundice, which came on about ten days before operation, very marked. Epistaxis and small hemorrhages into skin in various parts of the body. April 11 gave 15 c.c. rabbit serum. Bleeding less the following day, when 15 c.c. more were given. After April 12 there was gradual improvement, and although there was slight oozing from the wound for a few days, there was no further evidence of serious hemorrhage.

Five days after the second injection there were signs of probable infarct in left lung, and a few days later an effusion in left pleura which cleared without trouble.

B.—Hemorrhage of the New Born.

X. Boston Lying-in Hospital. History by Dr. Gilpatrick. Baby Mc. Born March 8, 1908. Birth weight 7 lbs. Female. Normal delivery. Two previous children healthy. Mother's convalescence uneventful. Baby normal at birth. Nothing remarkable noted until 23 hours after birth when baby vomited dark brown material. Several hours later a stool was noted to be bloody. On the hard palate two small hemorrhagic spots were noted and two areas of subcutaneous hemorrhage were seen on the right lower leg. Temperature at this time normal. Baby nursing well. March 10. Temperature normal in A.M. On right cheek is a hemorrhagic area and the spots on the hard palate bleed freely at times, No vomiting during the day. Temperature in evening 100. Vomited fresh blood

and coffee-grounds material. Stools bloody. Hemorrhagic area on cheek now about 3 in. in diameter. Considerable fresh bleeding from cheek. Baby took milk well all day.

March 11. Condition in A.M. about as yesterday. Temperature normal. One dose of rabbit serum (7½c.c.) given 3 P.M., and another at 11 P.M. Bleeding from cheek and mouth continued during day but no vomiting was noted. Stools tarry.

March 12. Temperature 101 in A.M. Vomited bloody material. Some bleeding from cheek. None from mouth. No vomiting during the last part of the day. Temperature in evening 102.2.

March 13. Temperature 102. No further bleeding from cheek or mouth. Spot on palate not so noticeable. One dose of serum (7½c.c.) in A.M. and one in P.M. Stools green in P.M. No vomiting now for 36 hours. Takes nourishment well.

March 14. Temperature normal. Area on cheek crusted over. Spots on palate and leg fading. Baby apparently doing well.

March 23. Baby continued to do well, discharged today, weight 5 lbs. 13 oz.

XI. History by Dr. John J. Mitchell, whose case it was.

"In reporting this case I shall preface it with a rather crude report on the sister of the baby who had same symptoms and died. The first report is from memory."

M. D. Born May 11, 1907, died May 15, 1907. F. H. The father states that he had a brother who bled profusely with the slightest cut. Nothing more concerning him could be learned. F. H. negative in other respects.

Patient was born at 10 P.M., May 11, 1907, after difficult version (the mother having a justo-minor pelvis) and was resuscitated with great difficulty.

May 13. Nurse reports small amount of mucus and blood flowing from mouth, saying that it began late the night before (May 12), also calls my attention to a black and blue spot in centre of right cheek. The spot is surrounded by a moderate amount of infiltration. In the evening of same day infiltration much increased, spot now about as large as a dime and cheek tumor about the size of a pigeon's egg.

May 14. New black and blue spots have appeared, viz., one on each ankle as large as five-cent pieces. Two upon back in scapular region and one on back of the neck. A peculiar hoarse metallic cry came from infant. It cannot take nourishment. In the evening the baby becomes stupid, pulse becomes very rapid (I don't remember rate) and respiration shallow and irregular.

May 15. Called at 8 A.M., to see baby. Tumor on right cheek as large as pullet's egg. Numerous punctate lilac spots over forehead and less marked over rest of body. Respiration of Cheyne-Stokes type. Died at 10.30 A.M. No oozing at any time from umbilicus, but if my memory serves me well I think there was hematuria a few hours before death. No blood noticed in stools. No autopsy.

Baby D. No. 2.

May 5, 1908. Born at 7.30 A.M., delivered by intermediate forceps.

May 7, 1908. Ecchymotic spot size of a dime on right cheek in almost exact locality as in M. D. While giving the morning bath nurse found a spot in right groin about as large as a pin point from which blood was oozing freely. After most careful enquiry could not get evidence of an injury to groin.

At 7 P.M. patient was injected with one tube (7½c.c.) of rabbit serum.

At 10.30 P.M. left cheek commenced to swell; at 2 A.M. it had reached its height, and at 4 A.M. it had subsided leaving a pale ecchymotic spot about as large as a dime.

May 8. Oozing in groin now completely stopped. No new spots.

May 9. At 10 P.M. a spot as large as the others developed at back of neck, and was accompanied by moderate amount of infiltration.

May 10, 10 A.M. Patient given another injection of R. S.

May 11, no new spots. All old ones gradually disappearing.

From this time on recovery uneventful.

May 28, have heard through baby's aunt that she is doing nicely.

XII. St. Mary's Infant Asylum. Service of Dr. Walton. History through Dr. Cahill.

Child four days old. Had been bleeding from the rectum, stomach, nose and gums, as well as umbilical stump. There was also consolidation of whole back of left lung, which at autopsy was found to be due to diffuse hemorrhage. Child had been bleeding for *two days* before exhibition of first dose (15 c.c.) of serum. Death followed within 36 hours.

C—Hemophilia.

XIII. Dr. Wm. D. Swan, Cambridge.

"R. V. E.—present age 12 years, 6 months. Had measles and scarlet fever in early childhood. At 9½ years, had her first attack of purpura simplex, characterized by bruised areas, petechiæ and nosebleeds, the latter frequent and severe. This condition continued, with intermissions, until January, 1907 (when she was 11 years old). At this time had been growing very fast and was tall for her age. In January she had an attack of diphtheria, for which she was treated by antitoxin (from 3,000 to 5,000 units). Recovery was uneventful. The nosebleeds ceased, the patient continued to have large and sometimes painful and tender ecchymoses and petechiæ.

In January, 1908 (patient then 12 years) occurred the first menstruation. Hemorrhage with blood casts of the uterus (normal shape) for 3 weeks, patient very anemic. Seen by Dr. Edward Reynolds. Recovery slow, at the end of 7 weeks' trip to Washington, from which place she returned in March, looking well and rosy.

Second menstruation 9 weeks from the first. Continued normal for 4 days, when it became hemorrhagic—at this time 15 c.c. rabbit serum from two syringes was hypodermically administered. Blood oozed from the needle punctures for ½ hour. 48 hours later this dose of rabbit serum was repeated. These punctures did not bleed, and the hemorrhage ceased in a few days.

The April menstruation was of the same character, 30 c.c. guinea pig's serum was given; the hemorrhage ceased gradually as the last time.

The May menstruation went on normally for 4 days, then almost ceased for 1 day, then became hemorrhagic; this time she had severe nosebleed, the first she had had for over a year. At the end of ten days the skin was waxy, lips pale, pulse 100 to 110, difficulty in taking food.

On May 24th: operation by Dr. J. C. Mumford, direct transfusion of blood, the donor being a perfectly healthy young man, and distant relative. The hemorrhage, which was watery red serum, ceased the following day. Patient looked brighter, and took food well. After three days, temperature began to rise, reaching 104, and gradually subsided without any local manifestations. The wound healed. The patient is now regaining health rapidly.

Two blood examinations were made by Dr. R. E. Andrews, in February and March. The first time the coagulation time was 13 minutes; the second 6 minutes."

In this case if hemorrhage recure I shall recommend that human serum, obtained by tapping the median vein, be used in lieu of further transfusion or animal serum.

D—Purpura.

XIV. Boston City Hospital. Dr. Ralph C. Larrabee.

Boy of 13. In December last was in bed 2 weeks with a sore throat. No doctor was called but boy said that he had diphtheria. In January, purpuric spots began to appear on skin, and continued with mild rheumatic symptoms up to March 1, when he was seen. 15 c.c. of rabbit serum was injected subcutaneously, and was followed by a disappearance of rheumatic symptoms, and a cessation of purpura. The rheumatism never returned. On the fourth day he had a serum urticaria with wheals covering the body. Over the lower part of the body these were hemorrhagic. There later developed a giant urticaria which showed hemorrhagic centres over legs. One week later urticaria cleared up, and in two weeks patient was discharged from hospital much improved, with few purpuric foci.

In this case through a misunderstanding only one dose (15 c.c.) of serum used. It furnished the only example of urtricaria which appeared in the series. The condition of the boy, even when the utricaria was present in most startling form, was good.

E—Post-Operative.

XV. History by Dr. W. H. Robey. Operation by Dr. Philip Hammond.

"Removal of portion of middle and lower turbinates with submucous resection of septum. Marked hemorrhage at

time of operation, and for following 24 hours. The second and third days, hemorrhage slight. On the fourth day three smart hemorrhages controlled by adrenalin. Fifth day, some blood. Sixth and seventh days no hemorrhage. Eighth day marked hemorrhages at 10 and 5 A.M. 15 c.c. rabbit serum subcutaneously. On the ninth day a considerable hemorrhage at 5 P.M., which was followed by the use of a second dose of rabbit serum, 15 c.c. From this time (11 days) no further hemorrhages appeared."

XVI. History by Dr. F. C. Cotton, whose case it was. Infant S., 8 days old. Ritual circumcision March 7, 1908, A.M. Seen by dispensary doctors in afternoon on account of bleeding, applied adrenalin, pressure, etc. Bleeding continued. There was a steady ooze from the cut skin and *also* from the mucous membrane of the glans penis where there had been pressure from dressings. A running suture around prepuce controlled bleeding in part for a time but did not do much. There seemed to be *no* bleeding from stitch holes. Then I applied actual cautery at black heat. This worked better and for some time bleeding ceased, and at about 2.30 I left him oozing only a little.

Next noon injected rabbit serum 3 c.c. At this time pulse still perceptible, but color not good. The bleeding had continued gently, unchecked by adrenalin applied by Dr. Sandler according to my directions. Up to this time there was no sign of coagulation on the wound except from the cautery and none on the dressings.

3 P.M. 2½ c.c. more injected. The bleeding ceased for a time but recurred. 5 c.c. in two portions injected next morning by Sandler, and next day there was some slow clotting but the case had evidently gone too far, and died the evening of March 9, 1908.

This seemed undoubtedly a hemophilia, but the history was poor; an uncle had died shortly after birth of umbilical bleeding, and a cousin, female, had had severe hemorrhages from tooth extraction. They thought there was someone else, but exitement and language prevented better history.

This was one of the first cases treated, and the serum was used too late and in too small quantity.

F—Uterine Hemorrhage.

XVII. Drs. C. O. Thompson and E. S. Bisbee. History by Dr. Bisbee. Mrs. H. 45. Two adult children and one miscarriage at six months some years ago. For several years has had marked menorrhagia. About Feb. 1, began flowing every two weeks. Apr. 1, flow became continuous and was profuse, with bright red blood and practically no clots. Patient grew progressively weaker, condition became serious within two weeks.

Patient first seen Apr. 15. Was at this time too weak to withstand operation. Vaginal packing gave some relief. Patient's condition improved so that curettage was practised Apr. 27. A large amount of curettings was obtained which were examined by Dr. L. S. Medalia and showed moderate glandular hyperplasia. There was no hemorrhage for three weeks, when bleeding was renewed. Patient has been flowing continuously for past three weeks. Vaginal packing with gauze gave little relief. Tight packing with non-absorbent cotton soaked with ferrous salphate gave some relief, but hemorrhages still continued. Ergot, aromatic sulphuric acid, fluid extract of hydrastis and adrenalin have been used at different times without avail.

June 16. 15 c.c. of rabbit serum were given subcutaneously and a gauze packing saturated with rabbit serum was introduced into uterus. Vagina packed with non-absorbent cotton.

June 17. Behind the packing was found about 4oz. of thick, dark, tarry blood with few small clots. 15 c.c. of rabbit serum subcutaneously. Vaginal packing re-introduced.

June 18. Less blood of same consistency found behind packing. Vaginal packing re-introduced.

June 19. No blood was found. Packing omitted. Color, pulse and general condition better.

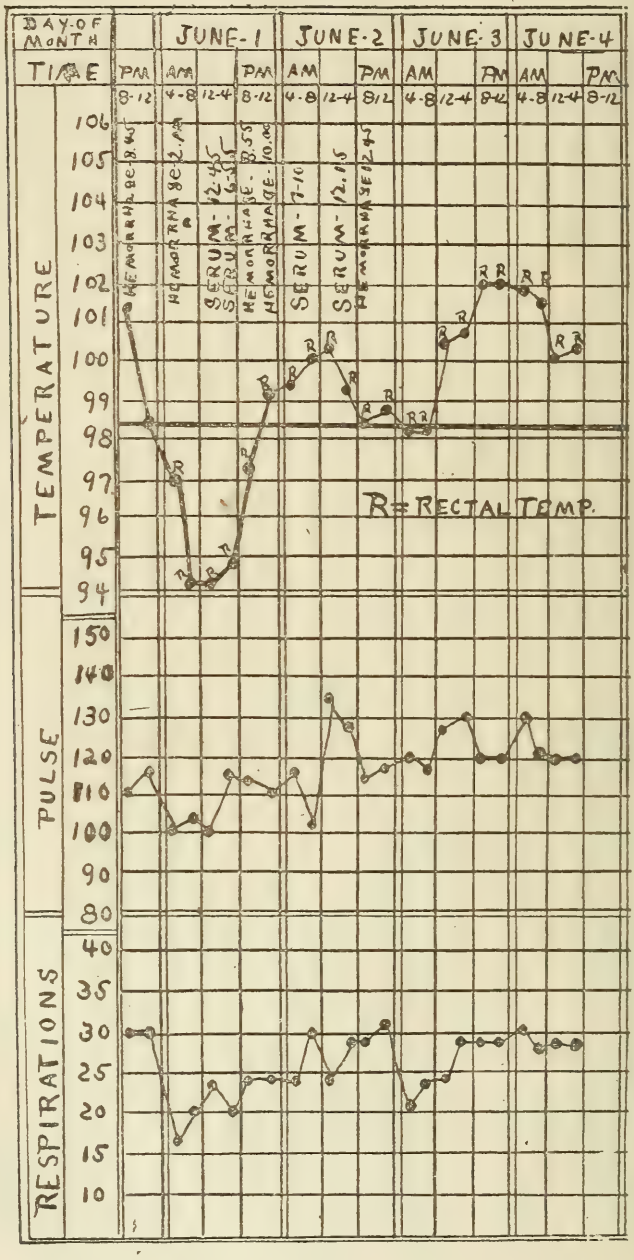
G—Typhoid Hemorrhage.

XVIII. History by Dr. John E. Somers, Cambridge, whose case it was.

J. D. Age 43. Typhoid fever. On the sixteenth day of the disease (Apr. 26) a number of hemorrhages from the bowel occurred, aggregating sixteen ounces (estimated). Apr. 27th, 15 c.c. serum injected. From time of first injection, hemorrhage for the balance of the 24 hours, till the

next injection, grew markedly less. Apr. 28th, injected 15 c.c. He still continued to lose blood, but in very much diminished amount. Apr. 30, injected 15 c.c. From this time forward the bleeding practically ceased, for while the dejections were somewhat discolored no appreciable amount of blood was lost.

CHART A.



XIX. Cambridge Hospital. Service Dr. E. A. Darling. History through Dr. Paine.

E. M. Female. 45. Had been caring for son and daughter with typhoid. For past two weeks has had headache, malaise and diarrhœa. Entered May 18th. In poor condition on entrance and grew progressively worse. At entrance dark brown stools, which gave guaiac test. On dangerous list May 24th. Hemorrhages May 31. 8.45 P.M., 10 to 14 oz. of fresh blood. A second hemorrhage at 2 A.M. June 1, patient in profound shock. Respiration sighing. Pulse barely perceptible. Dr. Darling looked upon the case as very desperate, and thought her chances of recovery were very slight. Dr. George P. Cogswell, who saw the case with Dr. Darling, thought the outlook hopeless.

7½ R. serum at 12.45 P.M.
7½ " 6.55 P.M.

A further hemorrhage at 8.55 P.M., and a small one at 10 P.M. June 2, 7½ c.c. serum at 7.10 A.M., 7½ c.c. serum at 12.15 P.M. A small amount of blood was passed at 12.45 P.M. (See Chart A.)

Since this time there have been no hemorrhages and the progress of the case is satisfactory. Prognosis now good.

This case illustrates not only the apparent value of fresh serum in controlling hemorrhage, but also its remarkable stimulant effect. I have found in the literature no specific references to the value of fresh serum as a cardiac stimulant. Some months ago, while treating a case of streptococcus meningitis in which ordinary stimulants began to fail, it was demonstrated that fresh serum given in divided doses was a circulatory stimulant capable of continuing life for considerable periods. This experience we have repeated so frequently that we are led to the conclusion that fresh animal serum is an extremely valuable cardiac stimulant. It will have no influence on the cause of the shock, if this be an infection agent, but it will aid in tiding over emergencies and permit of the use of other measures in controlling the infection. It is our intention to obtain experimental data upon this point.

The possible value of serum as a substitute for transfusion is suggested by the following case from the Boston City Hospital, service of Dr. L. S. Friedman, history by Dr. Callender.

Sadie F. Admitted Feb. 15, 1908. Immediate laparotomy. Patient practically pulseless. Twin tubal pregnancy in left tube. Abdomen full of blood. Resection of left tube. Abdomen cleansed of blood and closed. Patient pulseless at end of operation. A slight rally followed, but pulse was weak and rapid until after injection of 15 c.c. rabbit serum, when pulse improved rapidly in volume and tension and the patient began to show marked improvement, going on to an uninterrupted recovery. (See Chart B.)

The simplicity of the procedure, which from the clinical standpoint consists merely in the subcutaneous injection of serum, commends it in emergencies, where the delay and technical difficulties of a transfusion and the danger of hemolysis make the latter a debatable measure. It will of course not replace transfusion where there is actual need for blood.

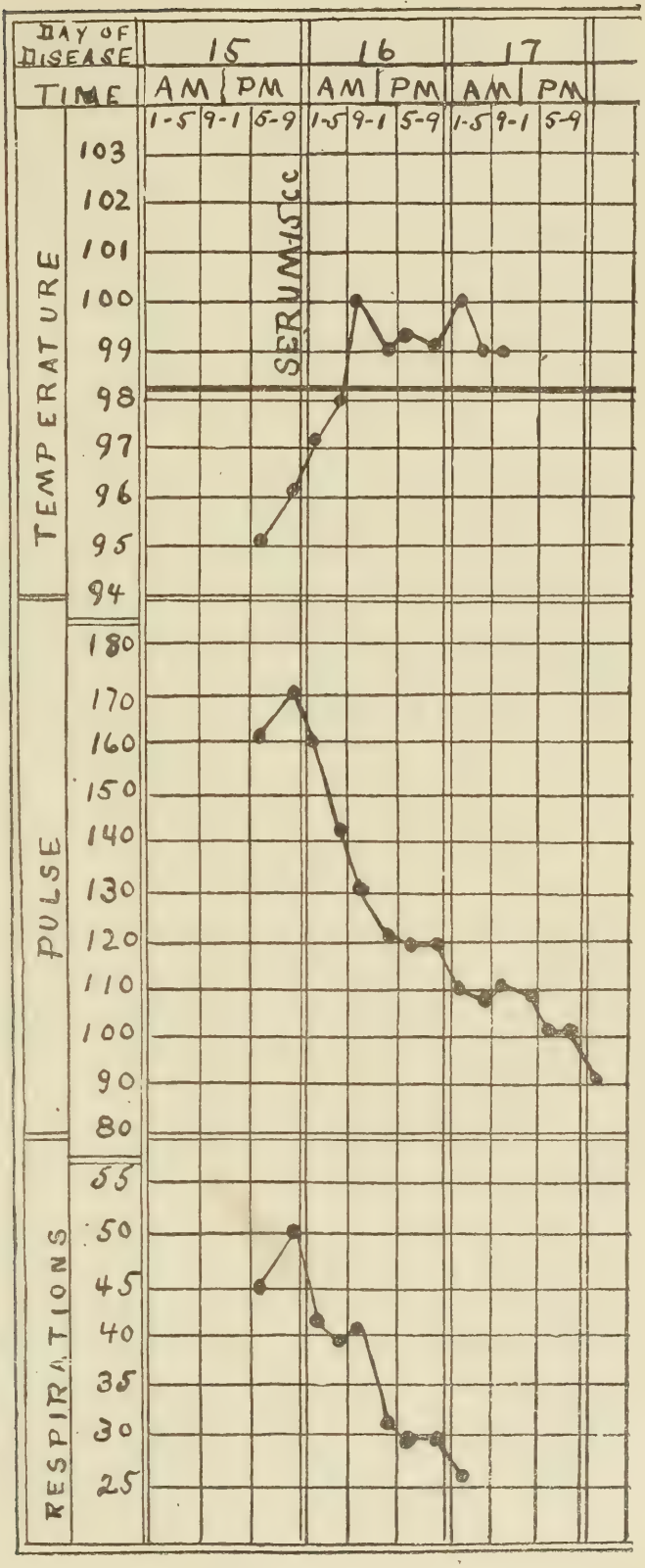
We are drawing no conclusion as to the value of fresh serum in controlling hemorrhage. The series of cases is too small. Weil's results, together with our own, suggest, however, that in this property of serum we have an efficient addition to present methods. We plead for a wider use of the agent.

In emergencies the physician who is not in touch with the laboratory can obtain blood from the jugular of the horse (tetanus the only serious danger) or from the median vein in man.

We desire opportunities to study further the clinical action of fresh serum. With this in view there will be kept at the laboratory a supply of fresh serum, which can be obtained immediately in emergencies.

To Dr. Lawrence W. Strong I am deeply indebted for assistance and suggestions.

CHART B.


DAY OF DISEASE
15
16
17
TIME
AM
PM
1-5
9-1
5-9
TEMPERATURE
103
102
101
100
99
98
97
96
95
94
SERUM 15cc
PULSE
180
170
160
150
140
130
120
110
100
90
80
RESPIRATIONS
55
50
45
40
35
30
25

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DISCUSSION.

Dr. S. W. Goddard, of South Boston: In the absence of Drs. Munro and Bottomley I have been asked to report our clinical results following the use of fresh rabbit serum in jaundiced cases which have been operated at the Carney Hospital, South Boston.

Dr. Leary has kindly furnished the serum, which in each case was injected subcutaneously promptly after its removal from the animal.

We have treated 8 cases in all in the past 4 months, the descriptions and details of which Dr. Leary has already given you. These cases, though few in number, show various degrees and duration of jaundice, and jaundice from widely varying causes, and we have had 2 deaths, neither of which in any way tends to disprove the value of the serum, as death in the first case was due to hemorrhage, the serum being given only a few hours before the patient succumbed,

and the other death being due to cholemia, the small amount of hemorrhage incident being readily controlled. The remainder of the cases, two of which were accompanied by purpura, had no bleeding whatever.

The injections in all cases were given subcutaneously, and caused no local or systemic disturbance.

While from so small a number of cases we cannot draw any accurate deductions, we are pleased with the seemingly good results as compared with previous cases operated under similar conditions, but without the use of the serum, if such a comparison can be properly made. It at least gives us confidence to operate upon cases that hitherto we should have been afraid to touch, and would have soon died without operation, and so we shall use it as a routine procedure before operating upon any jaundiced case or upon cases where post-operative bleeding is at all likely to ensue.

There certainly can be nothing to lose by adopting its use as a prophylactic measure, and we are in hopes that in the future it will become serviceable in overcoming one of the obstacles that is feared in operating upon jaundiced cases.

Both Dr. Munro and Dr. Bottomley wish me to take this opportunity to thank Dr. Leary for putting us on the track of this seemingly valuable prophylactic measure, and to urge others to establish its use, that soon we may arrive at the facts of the true value of the method.

Dr. E. W. Cushing, of Boston: I have only one case where I have used the rabbit serum—a young woman who had an extra-uterine pregnancy with a vast amount of blood in the abdomen, so that it seemed a very dangerous matter to operate. She was taken the next day after the operation with recurrent epileptiform convulsions—convulsions of some kind, for which we could find no particular cause. The convulsions were so violent that with each fit the jaw was dislocated.

No other cause being apparent, the convulsions were attributed to loss of blood, before the operation, and as the patient seemed to be dying, the fresh rabbit serum, furnished by Dr. Leary, was used.

Improvement was immediate, and after the second injection of the serum the convulsions ceased; and convalescence proceeded without further interruption.

ARTICLE VIII.

THE NEED AND VALUE OF HEALTH INSPECTION WORK.

By LYMAN A. JONES, M.D.
OF NORTH ADAMS.

READ JUNE 9, 1908.

THE NEED AND VALUE OF HEALTH INSPECTION WORK.

That the need for health inspection work should require presentation and explanation to a body of every day citizens is easily understood. The average citizen thinks but little and knows less about matters pertaining to health. The subject seldom touches him individually, except when preventable sickness has taken hold on him or some member of his family. And even then many of the more ignorant regard their case as something sent them by Providence, like the Frenchman whose house I was one day quarantining for diphtheria. After a somewhat lengthy disquisition upon the danger of infecting others, and the precautions that should be taken, which I flattered myself I had made especially plain, simple and convincing, the father of the patient turned to me and said, "But you know, I think the Lord He send these sickness, and it not right to do any thing to interefere with His will."

The sequel in this instance, owing to the lack of a contagious disease hospital, and the failure to realize that nothing short of a police guard would enforce quarantine, and owing to an entire change of the health board at this juncture, was that in related families near by, a number of other cases occurred, two of which were fatal.

In another instance when the mother of a little fellow who had diphtheria was remonstrated with for permitting the child to run about the house, and to cough and spit promiscuously, she replied, "He no sick, that no harm."

That the remonstrance was ineffectual is shown by the fact that other cases occurred in the family, and that one or two of them died.

That this subject of health inspection and its need should require presentation to health officials not infrequently, can also be readily understood in calling to mind the manner in which such bodies are formed and the personnel of which they are composed.

In cities, unless the charter provides otherwise, the mayor appoints annually a member of the board of health, one of whom must be a physician, to serve three years. As a matter of fact, in many cities the whole board is appointed annually. In towns the board of health may be elected, one member each year, to serve three years. In case no board is elected, the selectmen serve as such a board. If the population of the town is over 5,000 at least one member of the board, if there be such, must be a physician.

In consequence of this arrangement the larger places are apt to be better off than the smaller places. In the latter the selectmen frequently act as boards of health. The selectmen are largely representatives of one or another political party or faction, and they have no more knowledge of health matters than the ordinary citizen. Such medical advice as they may have occasion to seek, from time to time, will not infrequently come from someone whose influence they desire to secure, or is made the occasion of returning some political favor, regardless of the qualification of the adviser to give sound and intelligent advice.

They may refrain from insisting upon proper health measures or requirements for fear of estranging political supporters. In larger places this difficulty often arises from an unwillingness to proceed against prominent or influential citizens or corporations.

Narrow minded boards, through ignorance or failure to realize the necessity for health work, refrain from spending

money through a desire to keep the expenditures under, and imagine that they are careful and economical of the tax payer's money.

For example, a board of health not realizing the value of negative cultures to release diphtheria quarantine, declined to pay a bill for such work, and further refused to spend even the small sum involved in paying the express charges on cultures sent to the laboratory of the State Board in Boston.

The chairman of a local board of health, a physician, was called one day to see a guest at a hotel, and found the patient ill with diphtheria. He informed the patient of the nature of the disease, that he would have to quarantine him, that he would go out and get the cards, etc., and return in an hour or so to put them up. He also informed him that there was a train leaving town within a half-hour. On his return the patient had departed.

In another instance, in another hotel, the same chairman acted in like manner. In this case too a train departed conveniently soon after his first visit. On his return with the cards to establish quarantine, the patient was missing.

As a subject of speculation it might be interesting to inquire whether the towns whither these patients went were notified of these facts, as a matter of courtesy.

At first thought it would seem quite unnecessary to say anything to a body of physicians as to the need of health inspection work in the state, and yet during a brief experience in public health work, this very need has been assuming an increasing prominence; indeed in some ways it is the thing of most importance at this time. Unfortunately even by physicians themselves its necessity and value are not sufficiently realized.

There are, for example, physicians like the one who, recently, when asked if he had any cases of measles—none having been reported by him—replied, "Yes, lots of them,

but Hell, I don't report such cases : " physicians who choose rather to deliberately endanger the community for the sake of currying favor with this or that family by thus enabling them to avoid quarantine restrictions.

One physician said he had been told he need not come again because Dr. ——— did not put any card on the door for such cases and they preferred to have him.

In a hotel outside the state a clerk had scarlet fever. The physician called, said the patient could either go home or else he would have to quarantine him there in a hospital. The patient chose to go to his own home in this state, and several cases of scarlet fever followed in his immediate home locality.

A physician telephoned that a scarlet fever case was ready to be released from quarantine. An inspection showed that desquamation was still in progress on the hands and feet.

Another physician, annoyed by having his release cultures in a case of diphtheria returned positive, took a culture from his own throat, and when that too was reported positive, became more convinced than ever that the whole thing was foolishness, and the work of the laboratory in his opinion was discredited.

Another physician decided that a given case was not smallpox and was said to have advised that other physicians be not called in for fear they would pronounce it such. Seven other unmistakable cases of smallpox in the household later, told the story.

If physicians who are more less prominent in their respective localities will do these things, the necessity that they be educated along public health lines is evident.

The conditions thus far pointed out, and the incidents given, all of which are actual occurrences within a comparatively narrow range of observation on the part of a single individual, would seem to indicate unquestionably the need of health inspection work. If each physician could become

so impressed with the urgent necessity for public health work, that he himself would co-operate heartily with the various health authorities, and impress the importance of this work upon the laymen within his personal circle of influence, it would not be long before a splendid public health service could be built up.

In the abstract the value of individual health is usually recognized, though there are many people who are prodigal and wasteful of health, either through selfish indulgence or through a feeling of compulsion that certain things must be accomplished regardless of consequences. No argument however is usually required to convince an individual that with health he may accomplish much, and that without it he is seriously handicapped in carrying out what he may desire.

The value of public health is not so readily appreciated. In the abstract again, anyone will admit that it is good and desirable; but that it is worth the expenditure of public money to secure, is quite another proposition. People do not readily see the gain which corresponds to the increased expense.

The funds expended by the street department have substantial results in return; witness, paved streets, sidewalks and gutters. The sewer department with its funds establishes sewers, catchbasins, disposal plants, etc. The water department has reservoirs, miles of pipe, fire hydrants, and the like. So the park, school, and police departments show in various striking and evident ways returns for money expended.

The health department has no such outward results to bring forward for its expenditures. It is charged with the appropriation if perchance there is one, and it has gone largely for services, labor and supplies, which have left nothing visible to the eye, nothing which shows on the treasurer's books.

This leads to a reluctance to supply this department with

funds for much needed work, because it is regarded as a more or less unnecessary expense, as an extravagance, as money wasted on a fad which some radical and visionary people are urging without proper warrant.

In one town a prominent physician informed me that they had no board of health because they were afraid such a board would be a nuisance to the town on account of extravagant and unnecessary ideas they might wish to carry out. People who take this attitude are too much of the opinion that what sufficed for the fathers is good enough for us, evidently forgetful of the changed and changing conditions.

Health inspection work however has a very real value, none the less real because it does not appear on the credit side of the ledger. The following instances will perhaps serve to demonstrate somewhat this value.

In one city of less than twenty-five thousand, during a space of two years, there were 176 cases of typhoid fever, an average of 88 each year. During the second of these two years preventive efforts, continued to the present time, were begun by the board of health. During the four years following there were only 120 cases, an average of 30 each year, a saving of 58 cases annually.

If the expense of an illness like typhoid fever, counting loss of wages, expenditures for medical and nursing attendance, and extras of various kinds, be estimated at the extremely moderate sum of $200, there is a saving of $11,600 in each year for four years, or a total of over $46,000 which is a real saving in dollars and cents, and none the less a saving because it does not appear in the financial statement of the city's affairs.

During this current municipal year, now six months advanced, there have been but nine cases of typhoid fever.

This showing of the value, of the profit if you will, of health work would be more striking if the lives saved were

taken into account, for during this same series of years 15½% of the cases were fatal. On this basis over 45 lives have been saved. Surely this is a record to be proud of. The saving on this one disease in any one year has been almost double the entire amount appropriated for the usual work of the board for that year. And this represents only one item in the work such a board carries on.

In another instance, for lack of a proper system permitting the return of a child to school after quarantine, a boy was the means of communicating scarlet fever to 13 or 14 other children, two of whom died. The school was closed, and the school house fumigated, thereby entailing a direct loss, the amount of which cannot easily be estimated, which could have been successfully avoided had a suitable system for regulating such things been in force.

Health inspection work has a distinct value also in the affairs of individuals and corporations. I mean a direct financial value aside from its bearing on health, which factor is less easily estimated.

One concern, with thirty employees, situated in the country, had always used outside privies. Less than a year ago suitable modern closets were installed at an expense of over a hundred dollars. The manager assured me that in actual dollars and cents this sum and more had already been returned to him through increased efficiency resulting from the added comfort and healthfulness of his employees.

In another instance, in an establishment where forty men and women were employed, the superintendent told me that they were losing at least five dollars every week, because the employees were obliged to go a considerable distance to use very poor privies. This sum has since been saved, for growing out of the inspection came the installation of modern closets.

Many other instances occurring in the course of health

inspection work could be cited, but enough have been given to show that health inspection has a very genuine value, which is not generally recognized.

Granting that health inspection work is needful, the question comes, why should this work be carried on by the state? Why not leave it in the hands of the local boards, which are already clothed with ample authority?

The answer to this question has already been suggested in part in pointing out some of the conditions under which such boards come into existence, and the character of their members.

Grant further, however, that such boards are well informed about health matters, and that they are reasonably competent. This important fact remains true, that generally speaking we are all more or less selfish. Inasmuch as the whole is nothing more than the sum of its component parts, boards of health too are all more or less selfish. They are interested chiefly in preserving the health of their own town, and are prone to be not at all interested in the health of other towns, and often make special efforts to hold themselves aloof from co-operative measures. Under such circumstances, though the boundary line is imaginary, and the dwellings continuous, the conditions affecting health existing near the border line within the one town are rarely made the subject of a message of warning or advice to the authorities of the adjoining town.

One board allowed a case of smallpox to escape to an adjoining town, solely to avoid payment of the expense incidental to caring for the case within their own borders.

Practically this means numerous boards, each going its own way, along its own lines, subject to no supervision or oversight except in the matter of diseases dangerous to the public health where the State Board has coördinate powers with local boards, and in consequence the work is largely haphazard.

Further the makeup of such boards undergoes frequent and sometimes entire change with each annual election. This is especially true in the case where the selectmen perform the duties of boards of health.

The new comers have no more training than their predecessors, and they lack entirely the year's experience which the retiring members have perchance laboriously and awkwardly acquired, and before this board has become really valuable there is another change.

All these things point convincingly to the need for some means of uniting the various boards and making their work of mutual benefit, to the end that in safeguarding the health of individual towns and cities, the health of the whole commonwealth may be equally safeguarded.

The agency through which this should be accomplished is naturally the department of health. There should be the authority to supervise and coördinate through its agents the work of the local boards of health, and the right to force local boards to do any necessary work in case they failed through indifference, ignorance or unwillingness to maintain the established standard.

Aside from the central authority just mentioned, there are other lesser factors which would aid in securing an efficient health organization.

Local boards of health should be such, and should be independent of other officials, not identical with them. There would then be no temptation to consider the political effect in carrying out health measures. The only consideration then need be as to what will promote the public health. This point should receive further emphasis because public health is a most valuable asset, to preserve which arbitrary measures are often required, which under other circumstances would not be tolerated. This means that the best results cannot be attained unless health officials are free to arrive at decisions unhampered by other than considerations of health.

Because health work reaches out in so many different directions, many of which come unexpectedly, some of which cannot be foreseen, and because the judgment of trained and experienced officials is of greater value than that of newly appointed inexperienced officials, there should be increased tenure of office and members of health boards should be appointed in rotation. The present practice in some towns of appointing one member annually to serve three years should be made uniform. Members should be eligible to reappointment except for cause.

Having secured a health organization, experienced and capable, firmly convinced of the value of health work, various measures employed successfully in places should become uniform in their application.

A hygienic or sanitary history of each case of disease dangerous to the public health would be secured by the physician to the board, the appointment of whom is authorized under our present statutes, or through some properly trained agent.

This history would show the patient's name, age, residence, civil condition, occupation, school and church attendance, surroundings at home or shop, source of milk and water supplies, previous cases of the same disease in the home or neighborhood, etc. etc.

These records would be kept and tabulated according to circumstances, and such tabulation would quickly suggest special investigation. For example, a second case of scarlet fever or typhoid fever on the same milk route would suggest looking up the dairy which supplied the patients. Two cases of typhoid fever or even one would suggest looking up the well, their source of water supply. One or two cases of diphtheria in a school-room would suggest a special investigation of the room for a possible mild case of diphtheria untreated or unquarantined.

A system of showing cases of contagious or infectious

diseases by houses would soon indicate whether any house was becoming infected, and would suggest a more or less complete renovation according to circumstances.

To this latter point greater attention should be directed, and less emphasis placed on fumigation. Not that I belittle the process or need of fumigation in any way, but that there are many buildings so encrusted with accumulations of dirt and filth that fumigation, however thorough, cannot eliminate the danger without renovation as well.

In larger places the provision of contagious disease hospital should be obligatory, not permissive.

School inspection should not be dependent upon previous appropriation by the town, but should be made obligatory, carried on under uniform regulations adapted to the requirements of city, town and country schools, rather than according to the varying ideas of each local school or health board.

These are only a few lines along which such work, already begun, may naturally be developed. These and others yet to come will be effective, however, only in proportion as we all come not only to realize their importance, but to act as if we believed them to be necessary and succeed in impressing this necessity upon those with whom we come in contact.

We must appreciate, too, and insist upon the same to others, that public health measures are aimed at the good of all, intended to secure for all the greatest measure of freedom in pursuit of their various pleasures and duties, to secure increased productiveness and prosperity, through the doing away with preventable disease, a luxury and extravagance always, which we can ill afford.

ARTICLE IX.

STATE SANITARY SUPERVISION.

By HERBERT C. EMERSON, M.D.
OF SPRINGFIELD.

READ JUNE 9, 1908.

STATE SANITARY SUPERVISION.

At the first meeting of the State Board of Health, held at the State House in Boston, September 15, 1869, the senior member, Dr. Henry I. Bowditch, gave an address remarkable for its clear insight and deep convictions concerning State obligations toward the public health. In discussing the duties that might be assumed and matters that should be investigated by the State in relation to the preservation of the public health he says, "The authorities of a State are bound to take care of the public health . . . in order that each citizen may not only have as long a life as nature would give him, but likewise as healthy a life as possible." The duty of the State thus expressed by Dr. Bowditch has been generously assumed by successive legislatures which have enacted laws relative to public hygiene, and this feeling of responsibility is still further expressed in the comprehensive powers and duties assigned to the State Board of Health.

With the establishment of the State Board of Health in 1869 the work of sanitary supervision actually began. Members of the board were deeply impressed with the responsibilities of their new work and the same spirit of earnestness has characterized all succeeding boards in carrying out the intent of the Statutes.

Personal and local interests have been considered with reference to the larger questions of public policy and welfare. New fields of activity have constantly been undertaken and the investigations of the State have included a wide range of subjects which have a bearing, direct or in-

direct, upon the public health. Although the State has always kept close watch of the health of towns and cities, on the incidence of disease, the occurrence of epidemics, questions of public water supplies and proper sewage disposal, and the oversight of food and drug products in accordance with the State Laws, there has recently been established a new department of State Sanitary Supervision which directly affects the health of by far the larger portion of the population of the whole State. Previous to the establishment of the work about to be described, comparatively little attention had been paid to industrial hygiene and the effect of the various industries upon the health of the employees.

In 1871 the legislature requested the State Board of Health to inquire into the employment of minors engaged in all cotton, woolen, silk, flax and jute manufactures within the State and the effect of such employment on the health of minors as well as their mortality. This investigation was carried out by means of a circular of questions sent to 636 manufacturers. The result of this inquiry furnished data of considerable interest and showed that the subject was one to which too little attention had been paid.

In 1882 a valuable article was published in the annual report of the State Board of Health on "Our Eyes and Our Industries." In 1904 the State Board of Health was ordered by the legislature to investigate the sanitary condition of factories and workshops and other places of employment with respect to all conditions affecting the health of persons employed therein, and one year later this investigation was ordered to be continued. These investigations were made by personal visitation and the results constitute a most valuable reference work on the existing conditions of industrial hygiene in this State.

In 1907 the legislature passed a bill entitled "An Act to Provide for the Establishment of Health Districts and

the Appointment of Inspectors of Health." These inspectors were to be physicians acting under control of the State Board of Health, and in addition to their duties as prescribed by law, they are to perform such other duties as the State Board of Health may direct.

The duties of these inspectors are of a most varied character, and I shall confine myself to a brief consideration of some of their work with special reference to city conditions. Each inspector must be informed as to the general sanitary condition of his district, which means that he must keep in touch with the local boards of health, the morbidity and mortality returns and the occurrence of epidemics.

All this sort of work can be more easily handled in the larger cities where the local board of health is active than in the smaller towns, to which the inspector must necessarily devote more time. More important in cities, however, is the work of the inspectors along two lines, namely, the oversight of the sanitary conditions of all factories and workshops, school houses and all public buildings, and the supervision of the health of all minors working in factories.

It is the duty of the inspectors to see to it that the employees of factories and workshops are provided with the proper amount of light and air and that the places of work are kept clean and well ventilated. State laws clearly provide for order, decency and cleanliness in every department of manufacturing, and the time has come when the management of a factory must maintain a certain standard of cleanliness and ventilation for the benefit of its dependents, as well as keeping up the dividends for the stockholders.

Most manufacturers are now very much alive to the physical welfare and good health of their employees, not only because the State laws require them to exercise common humanity toward them, but because they find it to their own advantage to keep their dependents in good physical condition.

Occasionally a manufacturer objects to so much inspection which reveals violations of the Statutes enacted for the sake of protecting the health of the employees. One such manufacturer recently said that he thought he would be compelled to remove to another State where the laws did not demand such careful oversight of the sanitary conditions of his factory. In this case the actual expense to him to conform to the Statutes was but slight, but the idea of being obliged to keep the water closets in a clean condition, to provide sputum receptacles and the medical and surgical chest required by law, disturbed him exceedingly.

No general standard is laid down in the law as to just what constitutes proper removal of dust and dirt, proper ventilation and cleanliness in a particular factory. The conditions that are found in the best regulated establishments in the same line of work must serve as the standard for other industries of the same kind. Old buildings with their small windows and low ceilings present different conditions from the new, highposted structures with sides almost entirely of glass. But the age of the building is no excuse for leaving dirt and cobwebs in the corners, and letting the windows remain so thick with dust that they appear like a new kind of opaque glass. In many factories the custom prevails of washing the windows but once a year, but one usually finds the windows in the superintendent's office are cleaned very much oftener.

In connection with the maintenance of general cleanliness of factories and workshops, the law provides for the establishment of proper toilet facilities for both sexes. Happily most employers realize the importance of these matters to-day, and while reasonable compliance with this law is generally found, the extremes of good and bad conditions are also met with. Inspection of a large number of factories shows that whatever the nature of the business or the character of the employees, these closets can be kept in a

clean, decent condition if they receive the attention they deserve.

The proper removal of irritating dust is one of the special objects sought by this inspection, as it constitutes one link in the chain for the suppression of tuberculosis, which I take to be one of the chief objects of the inspection. One of the main sources of harmful dust is from dry grinding on emery wheels. The installation of proper hoods, suction pipes, fans, etc., required by law, is frequently strenuously objected to by the employers. The item of expense is the real cause of objection to these appliances on the part of the managers, while the objection on the part of the employees usually comes from poorly applied, unwieldy and awkward devices which have been previously used. In these days of piece work, speed is the main object of every workman, and anything that interferes with quick manipulation is objected to and generally thrown aside.

In many wood-working shops and rag-sorting rooms the fine dust is almost all removed so that the rooms are comparatively free from it. In some mills, however, there are no devices for removing dust from the sand-papering machines and the air is full of fine flying sawdust. In the paper mills using new and clean rags the problem of dust removal is far easier than in mills using old and dirty rags. The problem of removal of dust and dirt and the furnishing of proper light and ventilation becomes acute in the large factories devoted to the textile industry. This industry employs a larger number of persons than any other in the State. The weave rooms of these mills, under ordinary conditions, are frequently overheated, often contain an excess of moisture, are lighted by artificial light much of the time and insufficiently ventilated. To improve these conditions, which must necessarily affect the health of persons employed therein, is the problem which State supervision may assist in solving.

The oversight of the ventilation and sanitary condition of all school-houses and public buildings are included in the duties of the inspectors of health, and frequent inspections will be necessary to determine their condition at various times and seasons.

One of the most common causes of complaint in school-houses is the fact that the ventilating systems are so frequently out of order. There is often some trouble with the fans or with the motor, or in the flues, or with the heating system, so that high temperatures, cold draughts and foul air are frequently met with. Another cause of poor ventilation is the custom of overcrowding school-rooms far beyond the capacity for which they were originally intended. This is particularly noticeable in the lower grades. It appears to be the idea that large numbers of small children need only the same amount of air which would be furnished to a much smaller number of larger children. This is a wrong inference and should be corrected. The whole question of ventilation is, of course, a complicated one, but so far as the health inspectors are concerned, the danger to health of poor ventilation is to be first considered.

Another important duty connected with the inspection of public buildings has reference to the maintenance of a sufficient number of proper toilet facilities which shall be properly kept. It is to be hoped that nuisances that exist in connection with the water closets of railroad stations, theatres and summer resorts may soon be controlled and corrected.

The attention of the State Inspectors is continually directed toward the means that may be used to eliminate the spread of tuberculosis. Not only does the State law prohibit spitting upon the floor of any mill or factory, but now the proprietors of workshops and factories are required to furnish sputum receptacles. Although this involves some little expenditure on the part of the larger corporations, I have

generally found that the officers of these corporations realize the necessity of prohibiting promiscuous expectoration and I find that they are usually willing to provide the proper receptacles. It not infrequently happens that the foreman or superintendent with whom this subject is being discussed keep up a more or less frequent, although unconscious, spitting upon the floor.

Perhaps the most far-reaching results of the State Inspectors' work may be expected from their duties relative to the employment of all persons working in factories who are under twenty-one years of age. The inspectors must be personally acquainted with the health of all minors, with the kind of work done by them and with the conditions under which they are employed. Not only their physical condition must be inquired into, but sufficient acquaintance with their home surroundings and family history must be obtained so that tendencies toward any special disease may be watched for from time to time during the visits of the inspector. A physical examination must be made of all minors whose appearance or history suggests the presence of disease, and particularly with reference to a family history of consumption is the physical condition of a minor to be carefully ascertained. In this way incipient cases of tuberculosis may be discovered with the result that not only may a focus of infection be removed but the patient may be started on the road to recovery. A minor's unfitness for work or for the particular kind of work he is doing is to be called to the attention of the parents, employers and the State Board of Health.

The number of children who are placed at work as soon as the legal age limit of fourteen years is reached is very considerable, and these children will be closely watched. It is especially important that growing children who must work for their living be accorded as close oversight as possible as to conditions under which they labor, as occupations

involving the inhalation of irritating dust and noxious vapors, and the use of much artificial light must interfere with the child's development, break down resistance and become the starting point of illness and disease. Particularly is this true of young girls, and if parents and employers do not see the tendencies to ill health and disease in their children their attention should be brought to these facts.

I have recently seen a girl of seventeen who impressed me as tubercular although no definite signs were found upon physical examination. She was working in an inside room poorly heated and ventilated and lighted. Improvements in her surroundings were suggested which were agreed to by her employers. Before the next visit was made to this factory I ascertained that the girl had left her work and a diagnosis of tuberculosis had been made by her physician. I recently examined a boy of sixteen who weighed scarcely sixty pounds. He was doing very light work, and though undersized and poorly developed, no actual disease was found at this time. The importance of the inspection of minors becomes more and more apparent as new factories are visited.

In some cities the oversight of clothing made and repaired in tenement houses furnishes a considerable amount of work for the inspectors. This results in not only safeguarding the consumer but frequently brings to light cases of disease, especially tuberculosis, which otherwise might exist for months without detection.

The time does not seem far distant when the results of State Sanitary Supervision as developed in Massachusetts shall be productive of a greater degree of healthfulness throughout the State, and a partial accomplishment at least of the dictum of Dr. Bowditch that the State is bound to take care of the public health so that each citizen may live as long and as healthy a life as possible.

DISCUSSION.

Dr. A. S. MacKnight, of Fall River: The subject of sanitary inspection, especially the matter of State inspection, including the matter of medical inspection of health, was ably presented and discussed about a year ago by our very able Secretary of the State Board of Health, Dr. Harrington; and about the same time Dr. Frank G. Wheatley, Senator, read a paper on factory inspection. Our own Dr. Burrell, in his address before the American Medical Association, touched upon some of the qualities which ought to possess the physician, and outlined some of the ways in which physicians, alive to their opportunities in the various communities, might rise to the occasion. I might also say that Dr. William Sidney Thayer touched upon the same thing before the American Medical Association, and pointed out some of the ways in which physicians might be more than mere physicians, mere practitioners, whereby they might rise to the opportunities afforded in their respective communities of being "*sanitarians*"—of taking steps for devoloping certain lines of work which will be for the benefit of those round about, not exactly in the sense of charity, but something akin—along the line of advanced sanitation and a better condition of the public health.

The paper presented to-day, by Dr. Emerson, deals in a very broad and general way with the question as applied to a "State," and especially as applied to cities; while the paper of Dr. Jones deals more with the "District" community, and has a somewhat rural feature. I might say that a great many things which have been mentioned in both papers are not only actual, but are everyday experiences, in the lives of most of the practioners, particularly those engaged in Board of Health work, or who are engaged along sanitary lines. Some of the things which have been mentioned in the paper of Dr. Jones, are among the difficulties which we have to meet with day by day.

In the matter of State inspection as applied to the examination of minors (which is a very difficult matter indeed), in the first place, it is with great difficulty that one can get the overseers, or the superintendents, to allow the minors time sufficient for an examination. Sometimes it is impossible to examine them in the weave rooms or other

departments of a great mill, and it is necessary to have them taken out into the tower, or other quiet place; and even then, if four or five, or more, come in line (as is very apt to be the case) you meet one who can speak no English whatever; it is very unusual to find an interpreter, and that blocks the line. Consequently, you have five, or ten, or fifteen, waiting round about, with the overseers pushing and nudging this one and that to return to his machine and his work, therefore the examination is very unsatisfactory, so far as the examination of that minor is concerned. This occurs in some departments; it is not true of all.

Again, along the line of sanitary inspection so far as water closets are concerned; sometimes it is a fact that the water closets are inadequate in regard to size, entirely too small, and oftentimes close together, so that only a thin partition separates the sexes; that is particularly to be deplored, more especially, when we consider the number of minors, and the possibilities and dangers to which they may be subjected. Now, while tuberculosis takes up, of course, a great deal of our thought at the present time, and while the inspection and examination of minors is supposed to have a special bearing on the tuberculosis question, this condition as to water closets leads, in my belief, to possibilities in other directions, for the prospects of venereal disease are just as much to be considered as tuberculosis, and perhaps more, in factories, etc.

In some mills we find that superintendents are anxious to bring about a different condition of affairs. I have reference now to one mill, in which the superintendent has installed 44 water closets, at an expense of $150 each, on the ground that if he provides water closets, considered standard, they can be kept clean, and will require very little repairing and, possibly, he may bring about a better condition regarding his help and, in a general way, regarding cleanliness. In another mill the superintendent has taken the upper half of the sash of his mill windows and changed it, so that it hangs on a swivel, and the window swings as a transom might, so that there is better, purer air, better ventilation generally by 144 windows, so changed in that mill.

We find that mill men are specially apt to meet State inspection with remarks something like this: "The State is encroaching upon our work, requiring us to do things we

had no idea we should ever be called on to contend with." "Our business is to make cloth and to make dividends—to declare dividends." Nevertheless, deep down in the hearts of these mill men is a broad humanitarian spirit, and if our State inspectors will take the time and trouble to talk with them, they can show them that while they may have the ability to make cloth and to declare dividends, they are not *sanitarians* nor *physicians*, and that they know very little about these subjects. And I might say in this respect, that it is the part of the State inspectors of health not only to inspect and examine, but to educate—not the *Treasurer* or the *Superintendent*, but the overseers, and subordinate help.

Now, to mention another thing. Sometimes we meet an overseer who is in a poor condition of health, who has not been endowed by nature with anything that is robust, or anything that gives promise of long life; who may have a very frail, a very fragile, organism; he is scared almost to death if he finds in his department a case of profuse expectoration, or has reason to believe there is in that very room a tuberculosis case, well advanced. That man, himself, will seek to limit expectoration, and will try, as soon as possible, to find some way by which he can improve the condition of that operative, or find some one else to take his place.

So that, in different ways, along different lines, it is possible for us to bring about these changes, which in the end mean a better condition of health publicly, not only in the commonwealth generally, but in the mill, and not only there, but with benefit to minors. A great many minors are certainly employed under the age of *14 years*, required by the School and State law; they do not think anything about a lie; they are taught to lie; their parental influences are such that they are working at a tender age. I know of a factory where, at 4.30 in the afternoon, little tots come from school and clamber up three or four flights of stairs, to the spinning room, and spend the rest of the day, to 6 o'clock; and I know mill men who permit that condition of affairs. These children have nowhere else to go; there is no place made for them; the door is locked at home, and they muster in the street, and find their refuge in the mill, from 4.30 to 6 o'clock. These are some of the things which confront us in our inspection work. They are only a few, but they are very important.

ARTICLE X.

TUBERCULIN AS A MEANS TO DIAGNOSIS IN TUBERCULOSIS.

By
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AND
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READ JUNE 9, 1908.

TUBERCULIN AS A MEANS TO DIAGNOSIS IN TUBERCULOSIS.

In the intelligent consideration and as a result of close personal experience with the multiplicity of lesions of the tubercle bacillus, even the specialist frequently feels the want of means, other than clinical symptoms and signs, to aid him in its detection. Only the post mortem table can tell us how many cases, who have never given evidence of tuberculosis in life, have harbored the tubercle for months and years. If, then, we would discover the presence of tuberculosis at that stage, when a cure is probable, or even discern the latent focus before it springs into activity, the uncertainty of clinical measures must be supplemented by chemical means. The importance of tuberculin as a means of treatment is becoming well recognized, and in recent months, with the general educational movement against tuberculosis, interest has largely centered upon the various ways in which it can be utilized in diagnosis. The simplicity and comparative freedom from danger of some of these newer methods, make it a foregone conclusion that their application will be very extensive. With wide usage of such delicate tests it will not be difficult to detect tubercular lesions or even tendencies, but a nicety of judgment will be demanded in determining which cases require sanatorium treatment and which belong to the class that are ordinarily only discoverable at necropsy.

Discrimination in the selection of cases for the use of tuberculin is imperative and only harm can result to the

method as well as the patient if this is forgotten. Tuberculin is, and always will be a means with great possibilities for injury on account of its powerful toxic action, and even the simplest method of its employment should be used with care. Its greatest value is in the class of cases having had exposure to tuberculosis in the home, children belonging to that group known as pretuberculous, and also those patients with indefinite and inconstant pulmonary or constitutional signs. It is of great importance to be able to say of this or that child whose close observation has only detected a lowered vitality that the cause is tuberculosis. The cure of phthisis depends upon its early recognition, but the greater problem, the prevention of contagion, demands the detection of the disease in its closed stage. Our choice of method in giving tuberculin will depend upon the type of lesion present, the age of the patient and the constitutional symptoms.

As to the chemical conditions necessary to produce a local or constitutional reaction in the body tissues we are still ignorant. This is likely to be most marked in those tissues most exposed to toxic action by their close proximity to the foci of tubercle. This is shown in the virulent skin reaction obtained in cases of lupus where skin susceptibility is greatest. It would also seem that the affinity between tissue cells and the toxin of tubercle is binding and not easily broken, as shown by the ready response to cutaneous and subcutaneous tuberculin inoculation in cases where the foci of infection have been, to all appearances, quiescent for years. It is probable that cell resistance to the toxic products of the tubercle bacillus accounts for the tuberculin reaction whether produced locally or constitutionally. The severity of the response may depend somewhat upon the extent of accumulated resistance in the body. Immunization, while increasing resistance, lessens susceptibility. The type and extent of response to stimulation de-

pends upon the method used in giving tuberculin and the amount of individual sensitiveness. The marked reaction generally denotes an active focus while the delayed response, which occurs occasionally with every method, is generally thought to be due to latent lesions of considerable duration. The extent of the lesion necessary to produce a reaction to tuberculin is still undetermined. Many a case will show an active response when all other diagnostic means have been negative. Autopsy records on infants and children giving a tuberculin reaction in life will in time settle the question whether a reaction ever means anything but tuberculosis and how extensive a lesion is required to produce it. The response of so many apparently healthy individuals to tuberculin means nothing more than that our diagnostic measures are too delicate and the remote as well as the evident lesion responds. The presence of tuberculosis in the organism with the failure to obtain reaction from tuberculin by any or all methods occurs most commonly in two conditions, the advanced case and in acute miliary tuberculosis. Repeatedly with various methods of using tuberculin we have seen this result. Where the active protective agencies in the body are overwhelmed by repeated autoinoculations, resistance in time is paralyzed and even injections of large amounts of tuberculin produce no response. The machinery of immunization is exhausted. In the advanced case of phthisis we have frequently seen even the febrile center apparently exhausted and with the extension of disease a normal or subnormal temperature. In the acute miliary type active resistance is even more quickly at an end on account of the multiplicity of foci present. Likewise in cases under treatment with tuberculin, the various tests are frequently negative as the accumulation of anti-tuberculin bodies in the system negatives the dose, and no reaction occurs.

METHODS AND TECHNIC OF GIVING TUBERCULIN FOR DIAGNOSIS.

There are several valuable methods of giving tuberculin diagnostically, namely the cutaneous, subcutaneous, the ocular, and several others of less importance. The subcutaneous test gives a reaction in about 98% of all cases of tuberculosis tested, the cutaneous test in about 50% and the ocular about 17%. The ocular or ophthalmic reaction denotes, according to Wolf-Eisner, active tuberculosis, while other methods when positive tell of latent as well as active foci. The means which we should employ in any case will be largely determined by the condition of the patient. In the febrile cases the tuberculin febrile reaction is manifestly of little value and in that condition we have recourse to the cutaneous or ocular reaction. In patients suffering with ocular tuberculosis, that test cannot be used, nor in very extensive skin lesions can the cutaneous. However, with several methods at our command each case can be tested satisfactorily according to the condition present.

SUBCUTANEOUS METHOD.

The subcutaneous method of giving tuberculin as first advocated by Koch has never been given up by the profession, but fear and prejudice have greatly limited its application. The indiscriminate use of large amounts of tuberculin with its following severe and often dangerous reactions have deterred many conservative men from its use. That harm has occurred from the improper giving of tuberculin no one will deny, but that greater harm has been done to the patient by the failure of his physician to make an early diagnosis in many cases is equally true. The febrile response in a positive case is typical and familiar, but if we depend upon temperature alone we shall frequently miss valuable evidence of tubercular foci. In every general reaction the constitutional symptoms and signs are quite as important

as the rise of temperature. General malaise, joint pains, nausea, occasionally increased cough and expectoration and diarrhœa, are evidence of general disturbance. Furthermore the local reaction of the skin at the point of injection, which frequently occurs in a positive case, means cutaneous susceptibility. By far the most important evidence of tuberculosis is the focal reaction in lung, skin or glands, wherever the process happens to be. Cogwheel breathing, broncho-vesicular respiration and the presence of moist râles where previously absent are of great value in localizing a pulmonary process. Occasionally where cough and expectoration have been temporarily increased, tubercle bacilli may appear in the sputum. In superficial tuberculosis of the skin or eye the local reaction with redness, tumefaction and secretion is clear and unmistakable. This test then, is of great value in early cases of tuberculosis of any region, and may by its prompt determination of a diagnosis preclude an unfavorable termination of many a pulmonary case. It cannot be used in febrile cases on account of other active symptoms, and should not be given in myocardial or aortic disease, in Addison's disease, or where there is probably bilateral tubercular involvement of the kidney. When used with care and intelligence it is the most accurate diagnostic agent we have in this disease. At best, however, it will always appear formidable, and the simpler methods will be of great value. It has two distinct advantages: first, that frequently the body will respond to this test when all other means of tuberculin administration are negative; and secondly, no other test can give us evidence of the focus of tuberculosis by means of a local reaction unless the lesion is superficial. We shall still, although employing the ocular and cutaneous reactions in diagnosis, frequently fall back upon this for confirmatory evidence.

CUTANEOUS METHOD.

The cutaneous test advocated by von Pirquet is one whose usefulness has a wide range, is easily performed and is generally reliable, especially in children. Its use in adults is still of questionable value because of the frequency with which reactions are obtained in apparently normal persons. The test is simple and is applicable in nearly all conditions simulating tuberculosis, including the acute febrile.

The method used by us is as follows. After cleaning the skin of the arm, a loopful of concentrated old tuberculin and also one of a 25% solution are placed upon it. A platinum lancet is then placed in the drop, and with a rotary motion the derma removed, allowing the tuberculin and the serum of the underlying tissues to mingle. A control test is then made without tuberculin. The wounds are protected with sterile cotton. In from six to twenty-four hours there appears in positive cases a red areola about the points of inoculation with swelling, itching and a sensation of heat. In forty-eight hours vesicles surmount the reddened area. The process may advance to pustule formation, but this is unusual. The vesicles are readily absorbed and crusting occurs. In mild cases the local signs disappear in seventy-two hours, but in more marked reactions they may persist for a week. Delayed reactions, denoting latent foci, occur with this test as with others, and begin, generally, in forty-eight hours. Constitutional symptoms occasionally occur and may be moderately severe in the hypersusceptible, but this is unusual. There are no dangers to the test where cleanliness is observed. The most marked reaction occurs in lupus of the skin. In advanced and acute miliary cases of tuberculosis the test is frequently negative. Lemaire has tested some 144 children by this means and finds that constitutional symptoms are rare and the reaction reliable. Engel and Bauer, having used the cutaneous reaction on some 300 cases, conclude that it is of great diagnostic value

in tuberculosis, but less certain than the subcutaneous test especially in children. Bandler, in carrying out a series of observations in adults, found that in skin affections such as lupus, psoriasis and syphilides, the great majority of cases, 22 out of 26, with tuberculosis of the skin gave a positive reaction. In thirty-seven cases diagnosed other than tuberculosis of the skin, ten gave a positive reaction. Tests carried out on cases of leprosy have failed to give positive reactions showing the specificity of the reaction to tuberculin. Arlong experimenting on rabbits and dogs after the intravenous, gastric or peritoneal injection of tubercle bacilli, found that the cutaneous test was uncertain and not reliable, while the subcutaneous test was positive. There are several modifications of the von Pirquet reaction which have given fairly good results. Tuberculin may be rubbed into the skin, injected into the surface of the skin, a simple puncture made through a drop of tuberculin or used in the form of an ointment as advocated by Moro. As far back as 1891 Epstein called attention to the local reaction occurring at the point of injection of tuberculin subcutaneously. Hamburger made use of this observation in some two hundred children using 1 mg. of tuberculin with reliable results. In advocating the use of ointment, Moro says that the technic of von Pirquet is unnecessary and by the use of an ointment consisting of equal parts of lanolin and old tuberculin a differential reaction may be obtained. Where the ointment is throughly rubbed into the skin, preferably over the sternum, in twenty-four to forty-eight hours a papular effloresence appears with some itching and burning. This lasts for a few days and then disappears. There are no constitutional symptoms. In surgical tuberculosis this, when compared with other tests, has proven its value, in Moro's hands, in some ninety cases. Our experience with tuberculin ointment consists of a series of sixty-four cases of proven phthisis in all stages, and in a series of children

with various diseases. The reactions obtained were very slight and generally disappeared in 48 hours. Many positive cases, either incipient or moderately advanced, failed to react. We do not feel that this test is reliable, especially in pulmonary tuberculosis. If reliable, its great value would be in its absolute harmlessness. The use of a tuberculin plaster has been a failure on account of the irritating properties of ordinary non-medicated plaster.

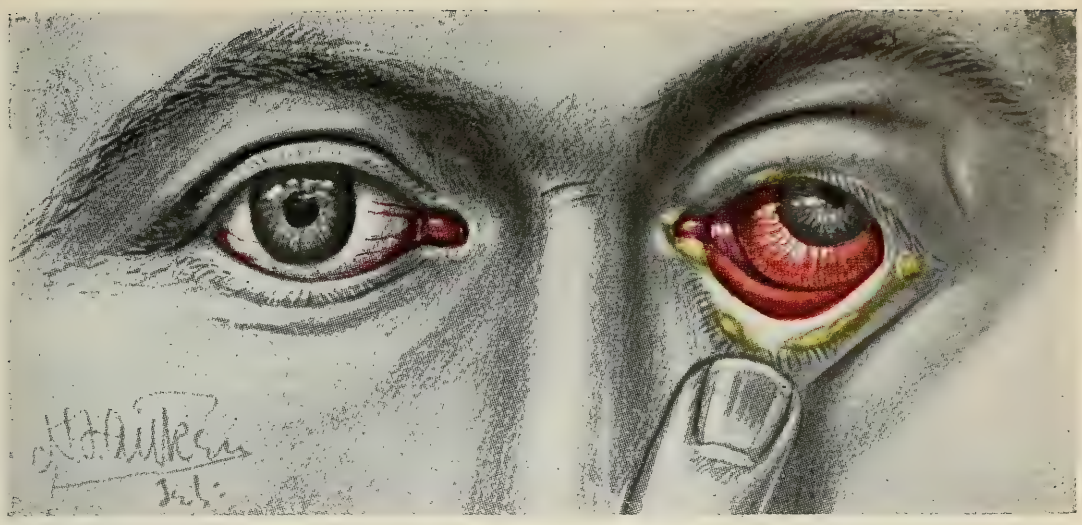
OPHTHALMIC METHOD.

The ophthalmic reaction to the use of tuberculin has been widely used, and promises to be very generally practised. Not only is the skin sensitized by the absorption of tuberculin, but the conjunctiva and other tissues as well. The conjunctival sac offers an excellent opportunity for the demonstration of local reactions, as the sensitized conjunctiva readily responds to the stimulation of tuberculin and slight reactions are easily detected against the white background of the sclera. The untreated eye is used as a control. The method as advocated by Wolf-Eisner consists of the instillation of a weak solution of old tuberculin into the conjunctival sac, and, when susceptibility exists, a local inflammation results. Calmette advises the use of an especially prepared tuberculin in order that there may be no danger from an irritant solution. To prepare the solution, the old tuberculin of Koch is first precipitated by 95 per cent. alcohol, the precipitate is filtered and thoroughly washed with 75 per cent. alcohol. The residue is then collected, dried over sulphuric acid *in vacuo* and pulverized in a mortar. The dried powder is then added to normal saline solution in sufficient quantity to make a solution of one to one hundred strength. The solution is then put into glass capsules, sealed and sterilized by boiling. A single drop of this solution is instilled into the eye. In tuberculous individuals after four or five hours the palpebral conjunctiva

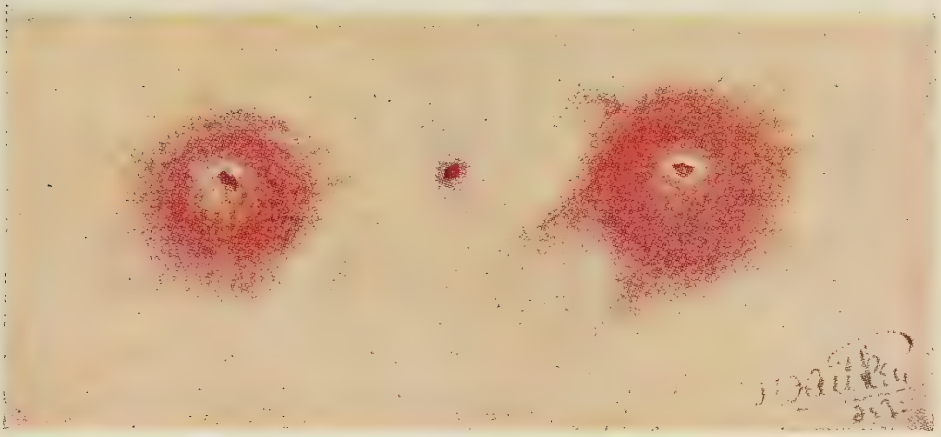
presents a well-marked injection, the corneal vessels are dilated and more or less lacrimation is present. The lids may be swollen, but no chemosis occurs. Occasionally the eyelid stings, and there may be an itching sensation, which is somewhat annoying. The reaction reaches its maximum in ten to twenty-four hours, and then usually rapidly disappears in thirty-six to forty-eight hours more. It has been found that tuberculin in strengths of 1 to 100 may give a moderate reaction in apparently normal individuals, or those having a minute indiscoverable focus. Thus, as in the Widal reaction, the positive test obtained in the high dilutions is of the most value, so here in the ophthalmo-tuberculin reaction a positive test with weak dilutions is of the most practical significance. In our use of this method we have used two solutions, No. 1 consisting of .5 per cent. of tuberculin in saline solution, and No. 2 of 1 per cent. solution. In using tuberculin in the eye it is well to begin with the weakest solution as in the subcutaneous method, putting a drop in the left eye, and where no reaction is obtained repeating the procedure with the stronger solution in the right eye after an interval of a day or two. It is necessary to give the second test in the eye unused for the first, as the conjunctiva may be sensitized by the first injection. This is thought by some observers not to occur except when tuberculosis is present. Not every case of tuberculosis will give the typical marked reaction as described by Calmette, but all grades occur varying from a slight reddening of the caruncle to marked conjunctivitis with edema and seropurulent secretion. The mildest reaction consists of a slight reddening of the caruncle, and this may be all that is present in a doubtful reaction. The more positive grades of reaction show a moderate injection of the conjunctiva, and in the marked reaction there is intense general redness of the eye, slight burning or itching, edema of the eyelid and some sero-

fibrinous secretion. The reaction generally appears in eight to ten hours, and at the end of twenty-four is at its maximum intensity. From this point it gradually disappears, and at the end of forty-eight hours more is entirely gone. Some reactions, however, persist for a week, especially the more severe ones, and occasionally the moderate conjunctivitis of a slight grade may continue for several days, especially in children. As a rule, the more rapid the onset the severer and longer the duration of the reaction. The ophthalmo-tuberculin test may be used in nearly all types of cases where tuberculosis is suspected, without regard to the presence of signs or symptoms of a complicating disease as pneumonia or influenza. As we depend only upon local reaction to give us aid in diagnosis, and there are no constitutional symptoms except very rarely a slight headache or moderate general discomfort in the very susceptible, the test has a wide range of usefulness. Cohn, however, in testing a number of cases of typhoid fever in the acute stage obtained a definite reaction in eleven out of twelve cases. Some other observers have obtained similar results. Cohn believes that the bacterial toxin of typhoid fever creates a hypersusceptibility of the conjunctiva, not only for the typhoid toxin, but also for the bacterial albumin of tubercle, colon, and other organisms. Our experience has been distinctly the opposite in regard to the toxemia of typhoid modifying the ophthalmic test. Of seventeen cases treated by us only three gave positive reactions, and these were children.

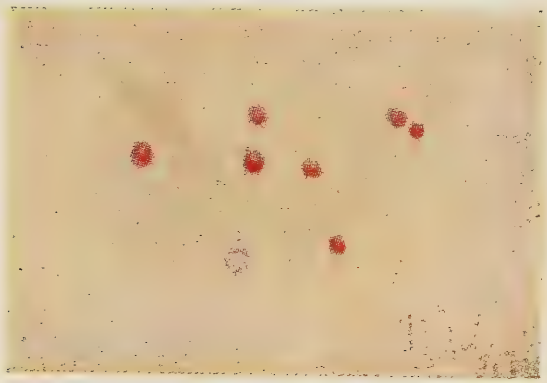
The only contra indications to the ophthalmo-tuberculin test pertain to the condition of the eye to be used. The presence of refraction errors can be discounted. When, however, conjunctivitis is encountered, tubercular iritis or corneal ulceration, the test cannot be used, both on account of the injection already present, and because of the changes that might occur to the eye through the irritation of the



OPHTHALMIC REACTION (SEVERE).



CUTANEOUS REACTION TO TUBERCULIN.



SKIN REACTION TO TUBERCULIN OINTMENT.

local lesion. The conjunctiva may remain sensitive to tuberculin following the test, not only for a few days, but for several weeks; in some cases as long as two months. This has been shown in individuals where, following a positive eye reaction, tuberculin was given subcutaneously to confirm the test. In a number of these cases following the febrile reaction the eye into which the tuberculin had previously been instilled again became injected, and this lasted for some time. The lack of a local reaction at the seat of the lesion, which is so often obtained and is of great value in the subcutaneous test, but is absent in the ophthalmic reaction, is a decided disadvantage, for we are unaided in localizing the focus of infection. A positive reaction always means tuberculosis somewhere in the body, and we have never seen a positive ophthalmic eye test that could not be confirmed by tubercle bacilli in the sputum, or by means of tuberculin given subcutaneously. Occasionally in a person apparently healthy a reaction will be obtained, and careful examination completely fails to demonstrate the site of the disease. We have seen a number of such cases, especially in children. Here the test should simply be taken as a warning to insure as perfect bodily health as possible, in order that the undiscovered focus may become quiesent.

The advantages of the ophthalmo-tuberculin reaction over the cutaneous or subcutaneous methods are that it is absolutely painless, whereas both the others are disagreeable to say the least. Practically no constitutional symptoms follow the use of the eye test, whereas in the subcutaneous test they are important to obtain and often very distressing, and also occasionally occur in the cutaneous method. In acute febrile conditions and also in diseases with an erythematous eruption, the eye test is still of value and its results equally positive, while the other tests are very limited in value under these conditions. This test is also recommended by its great simplicity, its rapidity and the

general definiteness of the results obtained. The ophthalmic reaction is not however without its dangers as shown by the constantly appearing reports of damage done to the tested eye. Although Calmette says that ten thousand applications of the test have demonstrated its harmlessness we cannot agree with him. Numerous observers have seen cases of conjunctivitis lasting for several months, and the more serious results, as corneal ulceration and interstitial keratitis, are occasionally reported. In our series of cases we have seen two subconjunctival hemorrhages, several cases of conjunctivitis lasting for a month, one case of phlyctenular conjunctivitis following the test, and one case of tubercular sclero-keratitis which was inactive and undiscovered, made very severe. No permanent damage however has been done. If the eyes are evidently normal we do not hesitate to use the test and have done so freely, with good results. De Lapersoune in investigating a number of reported cases of injury to the eye taking the form of keratitis, finds that they all occured where the lesion had previously existed, and thinks this test not dangerous.

Considerable animal experimentation has been done in regard to the reliability of the test and the rapidity with which it could be obtained after infection has occurred. The results are varied. Levy has inoculated guinea pigs with tubercle and later demonstrated the pathological lesion, but failed to obtain any ocular response to tuberculin.

In cattle Campbell and White have found the ocular reaction of considerable value to diagnosis. Vanderheyden in working for the ocular and cutaneous reaction in cows inoculated with tubercle, came to the conclusion that both tests were valueless in animals when used for diagnosis. Necher in inoculated animals has obtained a positive ocular reaction in every case. Nobecourt and Mantoux have studied both these reactions in rabbits and calves. In fifteen rabbits inoculated with tubercle bacilli in various ways

the cutaneous reaction was always negative and the eye reaction positive seven times in the series. Positive reactions were obtained on the nineteenth day following inoculation. Calmette and Breton in a study of the ocular reacton in rabbits infected with tubercle bacilli, gave them weak doses of tuberculin ½–2 mg. and three hours afterward obtained a positive ophthalmic reaction. In rabbits when 10-20 centigrams were given the reaction was negative. In the human, Lecky finds the test very acurate. In four hundred and ninety one published cases of tuberculosis 94% give a positive reaction and in six hundred and ten non tubercular, 92% were negative. In our series of some four hundred tests in adults and children, we have never failed to confirm a positive ocular reaction with a subcutaneous test where it has been tried. In comparing the cutaneous and ocular reactions we have found that while in the doubtful cases in which arrested tuberculosis was suspected the von Pirquet reaction more frequently was positive, yet frequently the eye reaction was obtained where the cutaneous test was negative. Oliver and Terres explain this result by the fact that the skin of some people is more easily sensitized than others. They advise the use of both tests and this we have done to some extent where the first test was negative. Wolf-Eisner believe the ocular reaction more valuable for the clinic than the cutaneous, and where the cutaneous alone is obtained where both tests have been given, then a diagnosis of latent tuberculosis can be made. Wolf-Eisner and Teichman have carefully considered the prognostic value of the ocular and cutaneous reactions. They think it evident from a large number of observations that when a reaction is rapid and marked, the prognosis is favorable. In less favorable cases the reaction is mild and not so prompt in its appearance. In the unfavorable cases the reaction is absent or slight. Our records show similar results. In some three hundred observations on suspicious

or incipient tuberculosis, in 90% the ocular reaction obtained was prompt and well marked. In those cases which had advanced tuberculosis or whose outlook was unfavorable little or no reaction was obtained. The test may be one of immunity and in this way will be of value in determining the duration of treatment required in a given case.

OTHER METHODS.

The use of tuberculin in diagnosis by means of inhalation is impracticable and unsatisfactory. Some observers have found that 30 mg. of tuberculin are required to produce a reaction, and even then it is unreliable. Tuberculin in the form of suppositories should not be used on account of its unreliable results.

The following series of observations may be of some interest:—

Group 1.

Patients exposed to tuberculosis, but negative on physical examination:

	Adults.	Children.
Positive eye reaction,	11	25
Negative eye "	55	37
Positive cutaneous reaction,	4	3
Negative " "	0	3
Positive eye reaction / Negative cutaneous reaction	0	3
Negative eye reaction / Positive cutaneous reaction	1	2
Positive eye reaction / Positive cutaneous reaction	0	0

Adults, 71 Chd'n, 73 Total, 144

Group 2.

Patients suspected of tuberculosis on account of symptoms or slight signs:

	Adults.	Children.
Positive eye reaction,	94	58
Negative eye "	61	30

Positive cutaneous reaction,	13	20
Negative " "	10	12
Positive eye reaction } Positive cutaneous reaction }	4	6
Negative eye reaction } Negative cutaneous reaction }	7	14
Positive eye reaction } Negative cutaneous reaction }	2	9
Negative eye reaction } Positive cutaneous reaction }	3	6

Adults, 194 Chd'n, 155 Total, 349

GROUP 3.

Positive cases of phthisis:

	ADULTS.	CHILDREN.
Positive eye reactions,	49	0
Negative eye reactions (nearly all advanced cases),	18	0
Positive cutaneous reaction,	3	0
Negative cutaneous reactions,	1	1

Adults, 71 Chd'n, 1 Total, 72

GROUP 4.

Cutaneous reaction from the use of tuberculin ointment:

ADULTS.		CHILDREN.	
Phthisis, Negative (14 advanced),	26	Normal, 23; Negative,	23
Positive,	6	Tubercular Joints, 4	
		Positive,	1
		Negative,	3
		Tubercular Peritonitis, 5	
		Positive reaction,	1
		Negative reaction,	4
Adults, 32		Children, 32	
		Total, 64	

Grand total, 629 cases. Adults, 368. Children, 261.

If we examine the results of Group 1 we find that 98 cases, or nearly 70%, were negative to a tuberculin test in

some form, confirming the physical examination, and showing that in the majority of instances careful observation of the patient will not lead one far from a correct diagnosis. Likewise in Group 2, among 349 cases suspected of tuberculosis on account of signs or symptoms, the sputum being negative in every case on repeated examination when it could be obtained, 66% of the cases were tubercular, as shown by one or more tuberculin tests. In these two groups of cases it is further of interest to note that in fourteen instances, when both ocular and cutaneous reactions were given, the ocular reaction was positive when the cutaneous was negative. These were almost all in children. In ten cases of Group 2 both reactions were obtained in the same case. In about one-half the cases of Group 3 the tuberculin reaction was obtained, and some time later the diagnosis of tuberculosis confirmed by presence of tubercle bacilli in the sputum.

We feel that our experience with the use of these newer methods of giving tuberculin as a means to diagnosis in tuberculosis has been of value in confirming our suspicions in many a doubtful case and in leading us to place more value upon slight signs and symptoms. The sociologic importance of the general diagnostic use of tuberculin will be immeasurable in the community in its great struggle with tuberculosis. Many a case will thereby be detected early and cured, but the greater measure of prophylaxis will be appreciated and utilized as never before.

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DISCUSSION.

Dr. W. A. Griffin, of Sharon: It has been very clearly stated that an early diagnosis of tuberculosis is of the very greatest importance, and especially is this true from an economic point of view. If we can get a patient under treatment in the first stages we can do in a short time what afterwards would take months to do, when the case has progressed a little, and the result would usually not be as good. And so every means that we may have of making an early diagnosis of tuberculosis is well worth while.

One of the principal desires, it seems to me, in the use of tuberculin is to have as slight a disturbance as possible to the patient. At the same time we wish to have a sure test. If the patient has tuberculosis we wish to make it absolutely positive by our tuberculin that such is the case; and on the other hand if he does not have tuberculosis we wish to make sure by the test that he is free from the disease—that is, given a negative reaction, we wish to be able to say that there is no tuberculosis.

As for the different methods of giving the test, Dr. Floyd has shown that for each there are advantages with particular individuals, and that the old test first devised, the subcutaneous method, is after all the most reliable. At the same time, it certainly has with it the possibility of exciting a larger disturbance than the other tests; and if the patient

cannot be under ready control, it is possible that some prolonged disturbance might be set up. In that connection I have in mind a patient in the Sharon Sanatorium who came to us about six years ago. Her case did not discourage us in the use of tuberculin by any means, but it did teach us caution. She gave the following history. She was a hospital nurse, and quite by accident her lungs were examined with the result that fairly extensive signs were found over one side of the chest. She never had a cough, never any expectoration, and no temperature. We had her at Sharon for about a month, when it seemed wise to test her with tuberculin to make sure that the process in the lungs was really tuberculosis, and to that end I gave her 2 milligrams of tuberculin. Following that for a matter of two months or more, the temperature shot at times to 102 and once to 103. She was confined to bed, began to cough, and I found tubercle bacilli in the sputa. I sent a record of the case to Dr. E. R. Baldwin, and he gave the opinion that the symptoms were not due to the tuberculin, but were merely incidental following an indiscretion in walking just about the time the tuberculin was given. At the same time such a case in private practice would give us a good deal of concern, and it shows the importance of exhausting the other means of diagnosis before recourse is made to tuberculin. In this particular instance no ultimate harm was done as the patient has recently reported herself well and able to work at nursing.

I have found a slight difficulty in getting the patients at the Sanatorium to accept the eye test, strange as it may seem. They prefer to take the subcutaneous test and go to bed for a day or so, than run the risk of an inflamation in the eye. The cutaneous test is very easily done, and a positive reaction is certainly most easily borne by the patient.

ARTICLE XI.

THE NECESSITY OF DISINFECTION AFTER THE DEATH OF TUBERCULOUS PATIENTS.

By HENRY JACKSON, M.D.
OF BOSTON.

READ JUNE 9, 1908.

THE NECESSITY OF DISINFECTION AFTER THE DEATH OR REMOVAL OF TUBERCULOUS PATIENTS.

At this time when so much money is spent and so much time is given to aid those suffering from tuberculosis, it is certainly wise to make exertions in every possible way to prevent the development of new cases. A very important branch of the work, now in thorough working order under the charge of Dr. Locke in the Municipal Tuberculosis Out-Patient Clinic at Burroughs Place, is careful search for signs of early tuberculosis in the families of those known to have the disease. Similar work is being done by the school inspectors and by the social workers connected with the Massachusetts General Hospital and the Association for the Relief and Control of Tuberculosis.

The first necessary factor in giving relief is the knowledge of the existence of the disease and this is obtainable in a small but an increasing number of the cases by registration. Tuberculosis is now placed by the Board of Health in the list of contagious diseases in which compulsory registration is required. In the year 1907, 2619 cases were reported; though this is an improvement over past years, we readily see that only a small proportion of all cases were reported when we know that 1138 died of tuberculosis in the year 1907. A very large proportion of the registered cases came from one or other of the following sources,—the hospitals, the tuberculosis clinics or the Board of Health Laboratory where sputum analyses are made. This leaves a very large number of cases existing in the city, in regard to

which no reports are made. For this omission we as physicians must acknowledge that we are personally largely responsible, yet we are not responsible for all such omissions. Many persons, who apply for an examination as to the presence of tuberculosis, purposely give the wrong address to avoid publicity. We find a strong desire to avoid registration essentially in two classes of cases: first, in the well to do classes who wish to prevent any publicity as to their condition on account of personal, family or social reasons. We cannot rightly have any sympathy for such reasons. Second, the very poor, who at best live in wretched lodging houses, dread to have their disease known of, as they are thereby driven from one house to another and often have great difficulty in finding any place in which they can obtain lodging. I know from the reports of social workers, the great suffering inflicted upon the very poor from this reason. We must sympathize with these people; they are often of the ignorant class, cannot understand the reason for their forcible removal, and their suffering from the disease is indeed much more acute because of the fact that they are obliged to move from one wretched tenement to another. The latter class is by far the most dangerous and their itinerant life makes them a far greater menace to the public than is the case with individuals in better social circumstances who can live and die in one place.

The 2619 cases reported in 1907 represent only a small part of the existent cases of tuberculosis in the city in that year; some statistics place the probable number of cases as ten times the number of deaths. The recent estimate of Dr. Locke that there are probably 10,000 cases of tuberculosis in the city af Boston, suggests the possibility of the correctness of this estimate, in that in 1907, 1138 persons died of tuberculosis in Boston. Of one fact we are sure, the number of deaths, and these in 1907, were 1138. The cause of death must be reported and the place where the death occurred.

Our Board of Health orders an immediate disinfection of the premises after a death from tuberculosis and this is done in all parts of the city, irrespective of the care taken by the patient or his friends during life. This is a most important advance in sanitary reform; important, as the authorities have definite knowledge of all deaths; important, because in the last days of illness the prevention of the spread of the disease by care of the individual is necessarily much limited, and in the absence of trained medical care and nursing, is practically impossible. The disinfection is thorough: twenty (20) ounces of a 40 per cent. solution of formaldehyde are evaporated to every thousand (1000) feet of cubic space in the room. This is accomplished by means of a copper regenerator by which the moist formaldehyde is forced through a keyhole. The bedding and the clothes of the patient are spread about the room; all doors and windows are carefully sealed by strips of gummed paper. The room is left closed for twenty-four (24) hours. A strong solution of carbolic acid or bichloride of mercury is left by the man who does the disinfection; orders are given to wash the walls and floors with the disinfectant solution. The bedding is boiled. Practically, an improvement might be made if bulky articles could be removed to a central disinfecting plant, where useless articles could be destroyed, and such as were of value could be absolutely sterilized. The boiling of bedding is a difficult process at best where one has command of a large cooking stove, and cannot be considered in the house of the average individual.

Disinfection of rooms is undertaken by the Board of Health after every death; further, in quite a large number of cases, namely, after every removal to a hospital or other institution, and in a small number of cases, where a patient is known to have changed his home.

The Board of Health now has accurate knowledge of all

cases that apply to the various public clinics, and Dr. Durgin has made a special request to the hospitals for information as to the previous residence of such cases as have changed their residence shortly before removal to the hospital. This information is sought for to enable the Board of Health to more thoroughly disinfect all places occupied by the tuberculous.

In 1906, there were 1933 places disinfected by the Board of Health; in 1907, with a record of 1138 deaths, 2050 places were disinfected. These statistics are encouraging but show that much more may be done when systematic disinfection is carried out after removal of the patient to hospital or other sanatoria. In other places, the value of disinfection is appreciated, as shown by the recent interesting report of the Holyoke Association for the Prevention and Relief of Tuberculosis. I quote from this, their first report:

"On February 4, 1907, the Holyoke Medical Association held a public meeting in Y. M. C. A. Hall. The topic for discussion was 'Tuberculosis,' and Drs. Bliss, Dickson and Gabler read papers, covering the main facts relating to the history, cause, means of prevention, and cure of the disease. So much interest was aroused at the meeting, that a committee was appointed to plan for an antituberculosis organization in the city. On February 22, 1907, a constitution was adopted and officers chosen for the ensuing year." Further on we read: "There have been forty fumigations after death and removals where almost nothing has been done before last year."

In 1905, Dr. A. K. Stone in conjunction with Mr. Alexander M. Wilson at that time the Secretary of the Boston Association for the Prevention and Control of Tuberculosis, wrote a paper on "The Geographical Distribution of Tuberculosis in Boston. (Boston Medical and Surgical Journal, vol. clii, no. 1, pp. 6–9). In this paper was shown the massing of the disease in certain sections of the city.

"The first thing of note on looking at Chart I is the situation of the plague centers, namely, the West End, the Cove and South Boston. Here the death-rate was over fifty per 10,000 inhabitants. The North End, Charlestown, Roxbury and Dorchester were not far behind with a death-rate of 40–50. Only one portion of the city at that time showed a rate of under 1, per 10,000, and that was the west slope and top of Beacon Hill. Even the Back Bay at that time had a death-rate of nearly 20. The average death-rate from tuberculosis for the city during these six years was 36.12 per 10,000.

"Now all this has changed; there has been a distinct improvement throughout the whole city, the average rate for the past three years, 1901–2–3, having been 21.71 per 10,000, a noticeable gain."

These "plague centers" were not wholly dependent upon local infection, as shown by Dr. Stone, but were largely influenced by the class of people inhabiting certain sections of the city.

At the present time, the Boston Association for the Prevention and Relief of Tuberculosis has under way a valuable investigation in regard to tuberculosis; namely, a home study of the various cases; Mr. Walter Kruesi, the Secretary, has kindly shown me a few of their early reports and allows me to quote the following statistics from their study of Ward 9.

In this ward, they have found 774 cases, living in 602 houses:

In	101	houses	2	cases	in	each	house.
In	20	"	3	"	"	"	"
In	2	"	4	"	"	"	"
In	2	"	5	"	"	"	"

While six, seven and eight cases were each found in a house in one instance.

These statistics are supplied by a non-medical staff and

refer to cases of well marked pulmonary disease and do not include the many cases of latent tuberculosis that would probably be discovered by a careful medical examination of all members of the family of the individual patients.

Such statistics offer a strong proof of the necessity of local disinfection in our work to prevent the spread of tuberculosis.

DISCUSSION.

Dr. S. H. Durgin, of Boston: I want to express my pleasure at hearing the paper which has just been read and which has shown what is being done and what ought to be done. It has been very difficult work in getting the physicians of our city to report cases, and while as your reader has said, there is some encouragement, that encouragement is not as rapid as it ought to be. It is not satisfactory by any means. I anticipated years ago, when we called for the report of these cases, that I should have slow work in getting them. In fact, I was told so by the physicians. However, it is encouraging that more cases from year to year are being reported and we are finding more and more ways in which to get hold of cases, not through physicians. All cases known to the Board of Health are seen, and so far as may be the family is taught how to take care of the case to prevent the spread of the disease, and in any known removal of such cases we disinfect. With regard to those cases of removal, we certainly do not get half of the cases of removal reported to us, and within a short time we have made a regulation that all cases of removal shall be reported to us by the householder, and he will be liable hereafter if he neglects to report to us cases of removal from his household. That will increase all immediate spread of the cases if known to the householder. It will correspondingly increase the number of disinfections also. In case of death we disinfect with formaldehyd gas, 40%, as soon as possible after the room has been vacated. We remove the household goods and disinfect with steam, which is always more effective upon things which will bear the

steam; not all things will bear this, but we intend to so spread out the clothing as to enable our process to reach all parts. For places and things other than the room we leave a 5% carbolic solution. You will note the fact that the number of disinfections and the number of deaths do not exactly correspond with the total number of cases that are known to the Board of Health. This is accounted for by the fact that a great many of these cases go to the Hospital and there die, and we do not disinfect. In 1907 there were about 900 such cases sent to the hospital. Speaking of hospitals, we find a bed wherever it is possible, and as you all know we are very much handicapped in that respect. There are perhaps eight or ten places where we find a bed now and then, and we get a bed as often as possible, and for only the worst cases. But we ought to have a great many more beds as well as a great many more things which cost money and money comes high.

Dr. E. O. Otis, of Boston: The subject which Dr. Jackson has presented is one of the highest importance in the tuberculosis problem. Tuberculosis has been well called a house disease, and investigations made in crowded tenements and blocks, such for example as the well-known "lung block" in N. Y. City, have shown that the disease is most prevalent where there is the greatest crowding, and as the number of persons living in one room increases so does the disease. Moreover, it has been found that where tuberculosis occurs under such conditions it recurs again and again, evidently showing that house infection has much to do with the spread of the disease. Hence the supreme importance of thorough disinfection, particularly in the crowded, tenement house sections of the city. Furthermore in order to make the disinfection efficient, not only the room which the tuberculous individual has occupied should be disinfected, but all rooms in the tenement in which the patient has passed some of his time should be subjected to the same disinfection. In New York City not only the ordinary disinfection is required, but renovation; the wall paper is removed, and the walls are recalcimined or white washed, and the painted wood work scrubbed with a solution of hot soda; all hangings, bedding, mattresses, etc., are disinfected with steam. In the same

city no tenement is permitted to be occupied again, which has previously been occupied by a tuburculous patient, until it has been disinfected to the satisfaction of the Board of Health, and until this is done a notice is attached to such a tenement prohibiting its occupancy. In order to control tuberculosis in the tenement, where it is most prevalent, we must have the knowledge of its existence, by notification, and in this the Board of Health is dependent upon the physician, and the more faithfully he reports his cases the more efficiently the Board of Health can do its part in disinfection. The dispensaries, hospitals, and particularly the visiting nurse can render valuable aid in this respect,—and are so doing—knowledge of all the cases which occur in the congested districts of a city, and thorough disinfection and renovation of the room or rooms where a case has existed are two essential conditions for the control and prevention of the disease.

Dr. A. C. Getchell, of Worcester: We have heard of what is done in Boston. It may be interesting to discuss what is done in smaller communities. It may be said in a general way, the smaller the town the less efficient is the Board of Health. Let me speak of the situation in Worcester. The Board of Health while requiring registration of tuberculosis patients according to the law makes no special effort to enforce it. But in that place sputum examinations are made free by the Board of Health and a positive examination constitutes registration. One other point. Many death returns of tuberculosis patients are not returned as such, sometimes because an accurate diagnosis has not been made, and sometimes a different cause is assigned, such as bronchitis in order to meet insurance requirements. In such cases the Board of Health evidently would make no disinfection of the premises, even if it were the practice in other cases. Just here the tuberculosis nurse is of great value. In Worcester, where there is such a nurse, she is in regular attendance at the two special tuberculosis clinics, and visits the homes of all the applicants at these clinics. She also visits all the patients of private physicians whom she is asked to visit. She keeps in close touch with these patients, and if they remove to another place or die she sees to it

that the Board of Health is notified and the premises are disinfected, which the Board of Health is ready and willing to do.

In many smaller communities where there is not a tuberculosis nurse there is a visiting nurse, employed by Charitable Associations. Through the instrumentality of these nurses I think disenfection of premises after death may be made much more general than it is at present.

Dr. F. T. Hyde, of Weston: I happen to belong to the rural district, Weston, and I merely want to speak of some of the work we have been doing. Since 1903 all cases have been required to be reported and I think there has been no case since 1903 that has not been reported to the Board of Health, and we have not found any objection to the reporting of cases, also all houses are thoroughly disinfected after death or after the removal of the patient and not alone the room but the entire house. Again, we recognize the need of disinfecting library books that had been brought from the library and used by the tuberculous patient. We have made a point of finding all the books and seeing that they were thoroughly disinfected before going back to the library and also the school books, and in one or two cases where the children were known to be tuberculous they have been denied the privilege of a public school, tuberculosis being one of the diseases now classed as "Dangerous to the Public Health."

ARTICLE XII.

THE HOME TREATMENT OF TUBERCULOSIS.

By ARTHUR K. STONE, M.D.
OF BOSTON.

READ JUNE 9, 1908.

THE HOME TREATMENT OF TUBERCULOSIS.

The Crusade against Tuberculosis has reached such a point that the public seem to be aroused. In a general way they are more enlightened upon the subject than are the mass of the physicians. The people have come to fear the disease, and this fear affects them in several different ways. 1st. They are more liable to look after coughs and colds and go to the doctor for examination earlier than has been their wont before, therefore it behooves us of the profession, to be able to honestly answer the question that they put to us: "Have we Tuberculosis?" We must learn to make a diagnosis early, and if in doubt, as we shall often be, not afraid to say so but to explain to them why they must come and be watched. 2d. The public has come to fear the persons who have the disease, a blind unreasoning fear in many cases, but a fear which, for the time being, is working harm to those who are afflicted with tuberculosis. Homes are closed to them, work is denied them. Only the other day when a young physician had obtained an ideal position in the country for his tuberculous brother, by chance the man with whom the patient was to work heard a lecture by an enthusiastic member of this society and immediately the contract was cancelled, and the young man came to me almost in despair to inquire what he should do for his brother. All this is right, and at the same time it is dead wrong.

It is right that the public should demand efficient protection. It is wrong that they should demand absolute immunity from danger. That is not to be found anywhere

in this world, and life would be stale, flat and unprofitable if it were absolutely free from dangers and vicissitudes.

Thus we see that the first fear should work for the good of the patient. The disease should be found early and in the incipient stage when there is hope of cure. Our duty is to be able to recognize the early stage and then to give wise advice suited to the particular case.

This is often particularly hard to do and it involves a thorough knowledge of all the methods in use to combat the disease, and a selection of the most appropriate ones for the person before you.

When all has been said as to ways and means by which the scourge of tuberculosis may be stamped out there will remain this important fact, that the brunt of the fight will have to be carried on in the *home*, and the work will have to be done for individuals and by the practitioners of medicine, or if they will not do it properly, by specialists whom the people will demand. In populous centres where there is over-crowding and proverty the work will have to be carried on in a wholesale manner, but still it will have to be done in the home and for the individual.

The hospital, and sanatorium, the day-camp and selected class will all be aids to the solution of what will be the best method of treatment of the individual case, but they will only be helps and will not touch the great numbers who will be cared for during all or the greater portion of their illness at their own homes.

The disease must be discovered early by the general practitioner. That is a home measure. You and I must learn to make early diagnosis. Careful, thorough work is required, and it will take time and bother, but it will well repay us for our efforts; possibly not in cash but in the consciousness of work well done; and we must not be discouraged at mistakes, we shall all make them; but we must make fewer and fewer of them.

Have we found an incipient case? The question arises—what shall be done? Here it is that the general practitioner, living in the midst of his own community and knowing the surroundings of his clientele, and the family resources, is able to prescribe for his patient without the intervention of the nurse or social visitor; indispensable as she is in the larger centres. In many cases it will be well to make a start by using a sanatorium or a neighboring camp to get the patient fully in touch with what is required to carry out the simple but difficult line of treatment for tuberculosis. The methods have been described so many times and with such wearisome re-iteration that we are apt to skip all details of treatment when they appear in the journals. We feel that we know it all. But I have seen physicians even, when told to rest and be quiet, spend the greater portion of their time walking "to get their legs strong." And if a doctor will do this in an acute stage of the disease what can be expected of a layman who has derived his general information from the Sunday edition of some metropolitan journal, and tells the doctor that he knows all about the details of the treatment?

Almost every incipient case would be benefited by a sojourn at a sanatorium. The hope that is engendered by taking the cure tends to steady the mind much disturbed by the discovery that they were afflicted by the White Plague. The fact that they belong to a great army of sufferers, all of whom are expecting to get well, is a great mental help. They involuntarily fall in step and do their best to become one of the "arrests."

But even arrested cases must return home and then should follow most careful supervision or there will be relapse and failure. The difficult *via media* between a hypochondriacal and a reckless state of mind on the part of the patient must be maintained. Encouragement or repression are to be judiciously but firmly exhibited.

The true condition of the patient must be found and his ability to labor and do things must be accurately estimated. It is not enough to say get "light out of door work." Stop a moment and consider, is there such a thing; certainly not in farming; there the work is hard and the hours of work are necessarily long throughout the desirable portions of the year. Most people have to do what they can do, and while chickens, carriage driving, greenhouses, bossing and time-keeping, and chores all offer an aid to a few, they are not by any means ideal occupations. Only when one has capital enough to be master, with full permission to go and come as he pleases, guided only by the dictates of his own feelings, are conditions at all easy. The majority of persons will find that they have to face an eight or nine hour job. Even municipal employment, should one be of the favored party, is getting to demand steady application, and the easy jobs are in great demand by the perfectly able-bodied politicians.

The majority of people will have to do their regular occupations. And they must be taught to do them so as to subserve their energies, and to come through with enough vitality to be able to recuperate in the 14 or 15 hours they may call their own.

Ambitions for the most part must be put away. The patient will have to be content with what he can do and the wage he can earn, even if that is only bare existence. But existence with comfort is a great deal for this world.

But for one whom you are able to treat as you would desire, by sending for a time at least to a sanatorium for a course of schooling, there will be many who, for various reasons, will elect to stay at home, be treated in their own homes. Be wise! listen to the whole story; do not insist that the patient shall go away, consider the outlay, the homesickness, the unreasoning desire, if you will, that the patient expresses to live at home, to live in Massachusetts

or Boston, and decide with wisdom whether it is best to break up families and incur debts. Remember that a contented mind will have as much to do in affecting an arrest of the disease as a proper climate, or ideal surroundings, and that the mental unrest and discontent may entirely undo the supposed advantages of an ideal situation. Above all do not send patients away to get rid of them. If the patient finally decides to remain at home, all the various conditions having been considered, how shall that person then be treated? Have him understand that he must have your advice about the ordinary details of life, and that for a long time he must look to you constantly for council and help. That it is the little things in starting that give the good results. That he must come to you for all his doubts and perplexities, and in turn you must be able to give him a return for his money and be full of really good, suggestive advice.

Should you have several patients of about the same stage of the disease it may be advantageous to form them into a "class," a modification of the system of treatment which has been so successfully developed by Dr. Pratt and others here in Boston. The inspiration of numbers is a great thing. The mutual meeting and discussion of the perplexities, of obtaining the maximum of fresh air, questions of diet and dress, beds and bedding, all can be discussed to great advantage in a group and the physician will gain knowledge as well as the patients from the contact of a group of persons striving after the same ends. Even when the class idea is impracticable the diary of daily events will be found of use. By means of this the patients will report accurately the amount of time spent in the open air, or in sleep, the amount of food taken, the condition of the bowels, the condition of the cough, etc. In certain selected cases they may be even trusted to take their own pulse and temperature. But in all cases the things to be recorded must be chosen with discretion by the physician in charge.

To those who live in communities where there is a local hospital and where there are a considerable number of persons with tuberculosis to be cared for, it will be found a help to the home care to have an out-patient service, or, as it is often called, a day camp, established in the yard of the hospital. The House of the Good Samaritan on Francis Street, near the Harvard Medical School, was the pioneer in this aid to home treatment. The camp has been in successful operation for over two years. In Providence this scheme is to be adapted to the local conditions and carried out on the grounds of the Rhode Island General Hospital. Cambridge and other communities are intending to adopt the plan in the near future.

You may have to convert Boards of Trustees, and you will find opposition in the shape of obstinate, opinionated surgeons, but it can be done. And it will give you the aid of the class system; the feeling on the part of the patient that something definite is being done in addition to the daily encouragement of the visiting physician and nurses, all of which give great impetus to the enthusiasm which is necessary to carry one through the discouragements of this most dreary disease. Indeed I sometimes think that the poorer people who are treated in groups have a better chance than those who are so well off that they can enjoy the depressing isolation of their own homes. That is why I urge you to form classes and camps for the treatment of your private patients who are going to remain at home or going to return home after their brief term of sanatorium schooling, but still needing rest treatment.

You must never get discouraged but cultivate the enthusiastic optimism of Chas. L. Minor of Ashville, or J. H. Pratt. Their success is not so much due to their methods but to their own intense personality thrown into their methods that gives them their results. The ordinary physician can usually have more of this enthusiasm before a group of people than before an individual.

Next, the physician must have an intimate knowledge of the home life in its details and try to regulate the conditions. It will not be enough to say keep out of doors. I have known a patient who was told that he must stay out of doors, waste valuable strength in walking miles and miles. But if you allow them to walk a half a mile see to it that they do that and no more; that if they wish to add another quarter of a mile they shall call upon you for permission. Regulate the details of the rest and work as far as you can.

Often you will be unable to get at your patient so that you will not be in touch with the real home conditions. It is here that the office or district nurse or the "friendly visitor" will all come in to help you in your work. Those of us who have to do with patients in the bulk, so to speak, in the cities find that the wise woman is invaluable in getting detail information, in telling you what is essentially wrong in the household, and what things are going to make for the recovery of the patients.

The nurse can often take a half hour or an hour or even more to find out small but important details—a time the busy physician cannot spend.

The diet must also be regulated. In many instances too much importance is put upon progressive gains in weight. It is not desirable to fatten patients, but it is necessary to get them, if possible, at or near their normal weight and keep them there. An excess of fat is not undesirable for it gives a margin of safety, as it were, in cases of temporary depression. It is, in a way, a measure of physical well-being as a bank account is a measure of prosperity.

There are times when one has to work hard to invent things to tempt the appetite. But the ordinary simple food, eliminating such articles of diet as may be found to be undesirable, and substituting those that are more wholesome, and adding to this regular home diet from one to two quarts of

milk, will usually give the necessary excess of feeding. The experiences of thousands of persons have proved that there are very few indeed who cannot take and digest an extra quart of milk each day without any discomfort. Indeed it is surprising to see the amount of milk the average person living in the fresh air will assimilate without the slightest effect on the appetite. Milk will always be our main reliance, with its cheapness and its food content, 600 calories to the quart together with its life saving *diuresis*.

Careful regulation of the bowels has to be adopted in certain instances to enable the patient to consume this food, but if that is attended to there is practically no difficulty. Olive oil, emulsions, cream, eggs and honey can be used judiciously as a means of getting in extra calories in as small bulk as possible.

Prof. Irving Fisher's tables of the caloric value of foods I have found of use in looking over dietaries of patients to see whether or no they where getting sufficient nourishment.

Special dietaries are to my mind useless, except as to the most general outlines. Everyone likes different things to eat. It was a policeman, I believe, who came to the matron of a private hospital in a rage because they were feeding his wife on "sweet-breads," and he was only pacified when he was assured that it should not happen again, and there should be plenty of corned-beef on the menu during the remainder of the patient's stay in the hospital.

The wise physician will also arrange the sleeping hours, or, at least, the hours to be spent in bed. When it is possible I think some out-of-door arrangement for sleeping is desirable. Dr. Millet has shown how this can be applied in the houses ordinarily found in the mill towns. Many of the city tenements have fine balconies at the back. Where these have the proper exposure they can be made, at a very small cost, most desirable and private for sleeping

apartments. Flat roofs can be utilized to support tents or shacks and small sleeping balconies can be put outside windows at small expense. Dr. Pratt has slept on the roof of his house in the Back Bay for several years in winter and summer, in rain and in moonlight.

The person sleeping out of doors must be suitably dressed and the body must be protected from the cold from below as well as above. The physician must be able to give advice as to keeping warm so that it shall be successful on the first attempts or the patient will become discouraged.

There is much to be said in favor of out-of-doors sleeping. First and foremost it is out-of-doors and there is all the fresh air that there is going; and second, when the arrangements are once made it is less disturbing to the family than to have the person sleeping in doors and trying to get approximately the same amount of air.

Physicians and nurses frequently advise the largest and best room in the house, which results to the great discomfort of the whole family, who are thus often banished from their usual sitting-room. Again the house is often thoroughly chilled by the cold air in one room and in many cases it is a decided additional expense to try to heat up the house when the temperature in one room is allowed to get down near, or below, the freezing point, sometimes approaching zero. In cold weather the air of a room has a chill and much more disagreeable feeling than a similar or even lower temperature out-of-doors. With the bed out-of-doors it is easy to have a warm comfortable dressing room, a most essential thing for the comfort of the patient.

One of the modern palaces in the suburbs of Boston has been built so that there are loggias outside the rooms occupied by members of the family. These are separated from the rooms by tight fitting French windows through which the beds can be pushed at night and then closed again, leaving the room warm and comfortable on the following morning.

One of the Brookline physicians in his house recently built has a most convenient arrangement devised for this luxury of fresh-air sleeping. Thus we see that the architects are beginning to arrange and plan for open-air sleeping, and it is to be hoped that this fashion will grow.

Theoretically, I believe that one of the many forms of window tents can be employed to great advantage in many homes when for one reason or another the out-of-doors bed is an impossibility.

Even in out-of-doors sleeping there is no reason to dogmatize and say that it must be done. At this time of year it is easy to try the experiment under most favorable conditions, though there will be found times in June and July, when the air is charged with the pollen of the grasses, that many patients will have to betake themselves into the house in order to prevent the persistent cough caused by the irritation of the air passages by these minute particles, even if there is no other ordinary manifestation of hay fever.

Rules for bathing and the water temperature of the bath must all be regulated by the physician according to the previous habits and present strength of the patient. No rule can be given which will fit every case.

Personal cleanness must, however, be insisted upon. The patient must understand that his sputum is dangerous; that it will fly in the act of coughing and may, nay will, contaminate the air and surrounding objects.

The patient's hands are bound to become contaminated, either from the sputum on the paper napkin or pieces of cloth held before the mouth, or from the spray escaping in the hand. Hence there must be frequent washings of the hands. And if there is much cough and sputum with bacilli present, either the patient should refrain from having anything whatsoever to do with the food of the family or should use most constant care, washing and re-washing the hands.

It is better that all spoons, knives and forks, cups and glasses which are in daily use by the consumptive should be kept separate from those of the others, and should always be washed in boiling water. Indeed boiling water should be a very frequent factor in the house keeping of a family where there is tuberculosis.

It is most discouraging to find after you have given attention to almost all details to find some day, accidentally, that something is being done which simply undoes all the precautions that are being carefully carried out. Dr. Knopf tells the story of a tuberculous woman who, when preparing her baby's milk, washed her hands, boiled everything in sight, made ready to feed the child, but first tasted the food to see that it was all right and then fed the baby with the same spoon which she had just put into her own tuberculous mouth. Therefore, it is well to see for yourself what the patient does from time to time, or to send your nurse to see what are the patient's habits, in the course of the half-hour and more interview when nothing is said about the disease or contagion.

Indeed one of the great things that the physician must keep in view is that the protection of the other members of the family rests upon his shoulders, and it is just as important as the personal care of the patient.

If the disease progresses and begins to run an unfavorable course there will come a time when the family will be all worn out with nursing, and it may be part of the home treatment to secure for your patient care in a hospital. A hospital for advanced cases is of the greatest value to a community, giving the opportunity for the best care of the patient, and it also removes from the family the source of infection when it is at its height; when the patient is too weak to protect those about him and the friends are too tired with constant watching, nursing and anxiety to protect themselves.

The State of Massachusetts is to build three hospitals; Boston is building a hospital. Those of you who live where there are local hospitals should strive to have a wing or annex built that will take the advanced tuberculous patient. Provision for care of advanced cases is needed in every community. Do your best to obtain them, and preach their advantages in season and out of season both to your patients and their friends until you arouse a sentiment in favor of the advanced case going to a hospital. Remember the general practitioner should be the educator of the community!

To recapitulate this very imperfect and rambling paper I have tried to say that in one way or another most cases of pulmonary tuberculosis have to be treated in their homes, and consequently by the general practitioner. He must, therefore, learn to do his work well in all its bothersome details. Sanatoriums, hospitals, and other public institutions are but incidents in the course of the treatment, and are to be used by the physician as freely as he makes use of any other therapeutic measure.

The impetus and the sane development of the tuberculosis crusade, and the thorough education of the people, are in your hands as well as the care of their persons—will you not make the most of your great opportunities!

DISCUSSION.

Dr. I. J. Clarke, of Haverhill: The home treatment of tuberculosis appeals to me as being the most important problem connected with the disease, and largely from these facts. First, 98% of all cases are treated at home. Secondly, less than 10% make a permanent change in climate. Thirdly, nearly every case treated at a sanatorium, and recovers, returns home sooner or later and is obliged to carry out in more or less detail the treatment for at least several years. The success of this treatment depends upon several important essentials.

The first would naturally be the confidence of your patient. By the larger majority of patients this treatment is looked upon with considerable distrust and derision ; it is too simple, it does not embody the use of those old black, mysterious, powerful, bad tasting medicines that human kind is so much accustomed to. We have not accomplished arrests or cures enough that stand as living monuments among the people to at once inspire confidence in this particular method.

The second essential is the masterful management on the part of the doctor. He must dominate the situation. Knowing that benefit is the matter of months, arrest of years, and cure of many years, he will map out the course accordingly.

Study the mental conditions of your patient. Encourage the despondent and with great patience instruct the ignorant. Make your directions clear and definite. It is necessary that you explain the nature of the disease to the patient. To give the impression that the course of the patient's illness is a slight affair will result in a misunderstanding as to the gravity of the disease with a consequent neglect of rules.

Nothing will be gained by deceit ; and frankness increases confidence, providing that after your unpleasant announcement to the patient you temper the situation of affairs by stating that he or she can be cured by following strictly the treatment as laid down. He must understand that his improvement and final recovery will depend largely upon his own conduct. The physician should have at his tongue's end numerous statistics of a very encouraging nature.

A most important factor is the training of the family. They too must adjust their life to the needs of the patient, must shield him from worries and cares, must encourage him in his hard struggle, and should be made to fully realize the length of time required.

The third essential is PERSISTENCE. This is a very important element from the standpoint of time. There is probably no disease so liable to relapse and largely from lack of vigilance. No case of pulmonary tuberculosis can receive any permanent benefit in less than three months or a cure in less than six, and for one that has passed the most incipient stages from two to three years are necessary. This means a skilfully long and well planned fight, and where undoubtedly most of our failures come, in what appear to

be favorable cases is from our lack of persistence and watchful care of the patient after the danger seems to have been passed. The false confidence the patient has after being relieved of noticeable symptoms often leads him to drift away from us and rest upon his own responsibilities, and when the time comes for us to relinquish the charge of our patient the danger of relapse should be most strongly impressed upon his mind even to the point of exaggeration.

The fourth essential is Sunshine and Fresh Air.

I am a firm believer in the balcony. The balcony possesses several advantages over the tent or other side affair, as follows. It is more roomy, secure and sightly. It opens directly out of the home, a warm room if you like where the patient can take his cold sponge bath, dress or undress if desired. It can be made large enough to contain articles of furniture that give it a home-like appearance. The patient can be waited upon and cared for much easier. It is a better protection from hard rains and snow. It gives women a better protection from intrusion. It is more cheerful and enables patients to receive callers under home-like conditions. It gives better ventilation than some tents. It is desirable that these be made at least eight feet square, larger if possible, and built from the second story. A window of the house is used for entrance and exit with a step on either side of the window. It should have a south or west exposure or both. Most of our summer breezes come from the south or west, and those of winter from the north and east from which we need protection. It should be securely built to resist high winds, and of considerable weight. Ventilating spaces running all round should be provided at top and bottom where the roof and floor meet the sides.

Sliding windows are better than curtains as they give you light in stormy days and are much easier operated; they are also more durable. The windows should be fitted with small wheels upon the bottom so as to slide easily, and space enough allowed so that all the windows of each side can slide by each other, in this way all the space is left for air except that occupied by one window. Screens or screen cloth can be fitted outside of the windows, also awnings. The latter can be arranged by running the roof timbers well over the side and ends, which will give you a chance to tack on canvas for shade in the warmest days. This can be

wisely left on during the summer months without interfering with the ingress or egress of air.

It is unnecessary to add that every comfort and convenience within the means of the patient, such as an electric light and bell, should be considered. This room is to be our patient's home for many months, perhaps years. One important advantage of a balcony is that it segregates our patient from other members of the household, a very necessary thing to accomplish, for we know how important it is to adapt every measure possible to prevent infection of others in the family. As to providing for the comfort of patients during the extreme cold weather: this can be readily done by their wearing some close fitting union suit that has a detachable head piece with an opening for the face only. This should cover the feet and come well down over the wrists. With this arrangement you will not require as many clothes, the weight of which patients complain of. During the most severe weather a carriage heater, which is by far the best way of supplying artificial heat, hot water bags or other devices, will have to be used. A few nights it is necessary to throw a crocheted shawl over the face to prevent freezing the nose and cheeks.

The expense of any good balcony of planed stock is about $40.

The fifth essential is rest. This is the hardest regulation to enforce. There comes a time, and it seems to me the most critical one in the whole history of the disease, when it requires the greatest amount of tact and diplomacy to control your patient, namely, after he has been free from fever for a week or two and is feeling much better in every way, and has the strongest sort of desire to get up, and he will do so unless every resource is brought to bear to prevent him.

The sixth and not the least essential is nourishment. A large majority of favorable cases will take a good amount of food. Milk and eggs with some variety of other nourishing drinks will be our main stay for some time in the more serious cases. A small per cent. of cases get where they cannot digest either milk or eggs. These generally do better to take small quantities of solid food, and if there is diarrhœa withhold fluids largely.

It is necessary to insist upon regular feeding at least six

times in twenty-four hours, and it is our duty to furnish a menu from which the patient can select. Forced nourishment to the limit of digestion is of the first importance. It is well to avoid sweets, fancies, much fruit or drinks except milk and water. The use of alcoholic drinks should be forbidden except in rare cases.

The expense of home treatment is less than at any sanatorium. There will be a certain per cent. of patients that will do better away from home. Among these will be those that are not submissive and obedient, also those in families lacking system, interest or discipline, those that have no near relatives or a home. Those whose income ceases when they stop work, but who can for a while at least have good food and rest, and those who for domestic and other reasons will take their chances at home. According to Osler there are various conditions that contraindicate a change to a high altitude. For this class of patients the general condition is of great importance, and a constitution capable of some resistance and organs capable of increased nutritive and oxidizing work are necessary. Special conditions are all acute cases, those with nephritis, diabetes, pronounced emphysema, grave anæmia, nervousness, rheumatism, severe gout, marked arterio-sclerosis, cardiac dilatation, persistent tachycardia, pronounced aortic or mitral regurgitation, uncomplicated or complicated by pleural adhesions, and pericarditis; those with feeble circulation and great susceptibility to cold, tendency to fever with slight ailments, those with small lung capacity, organic disease of the brain and cord, those with cavities or tendency to hæmoptysis, and those fifty years of age.

Furnishing some means of light employment for those in need will make the patient more willing to wait until the arrest of the disease is more complete.

While no one has had sufficient number of cases to treat at home to write many articles from this standpoint, yet but from the degree of success obtained thus far it is safe to assert that a few years will stamp this method as the treatment for consumption in a large per cent. of cases when in the hands of skilled and tactful physicians.

Dr. H. L. Chase, of Brookline: The hour is late, but I think there are about four things to keep in mind. One

the home treatment of patients of tuberculosis. In the case of well-to-do patients we should not consider any other treatment than the home treatment. There is no good reason for sending away well-to-do patients, but rather those of the poorer class where they can get well in sanatoriums, but in 97% we cannot send those cases to a sanatorium, even if they are ever so incipient. We must take care of them at home. At home the patient to stand the first chance to get well must live out of doors, must have absolute rest until all the symptoms are quieted down, must have sufficient milk and eggs and sometimes fatty substances like olive oil. Also the moral and mental side has to be considered as well. It is difficult to get the patients to recognize the importance of out-of-door sleep. We advise them to sleep where they have a chance to sleep on the roof where there are no balconies. We must not forget the value of sleeping with the head out of the window. I have had two men sleeping that way all winter and they have benefited by it. We must not forget that patients aided by their town or city cannot any longer be pauperized. It is true in Boston the aid comes from the pauper department. They may be helped by the town. They are not pauperized. They are helped by the Board of Health, not by the pauper department. This subject has been well covered by Dr. Stone in his excellent paper. What are we to do with the arrested cases of tuberculosis and supply the proper work for them? Dr. Worcester is going to give us help about this.

Dr. J. B. Hawes, Jr., of Boston: I am very glad to hear what Dr. Stone has said about the importance of home treatment.

I wish to speak briefly on one or two points which he has brought up, which I think should be given more emphasis.

In every case the physician should make a point ef examining not only the patient he is treating, but the other members of the family, especially the children. In this way many early cases of consumption will be discovered. One of the first things which I tell my patients, who come to my tuberculosis classes at the Massachusetts General Hospital, is that they must bring the other members of the

family for an examination. After the importance of this is explained, there is no difficulty in arranging it.

I feel that my hospital patients are getting somewhat better treatment than I can give to my own private patients. This is because at the hospital I have a nurse or trained volunteer visitor who can go into the homes of the patients regularly and see that my instructions are carried out. This can rarely be done in private practice as scientifically as I could wish.

I do not believe that window tents offer a solution of the problem of getting patients in tenement districts of a large city fresh air at night. I have not found them satisfactory. The best and more elaborate kinds are far too expensive and the simple home arrangements, such as can be made for $2.00 or $3.00, are not efficient. A bed room with two windows, with the bed in the middle of the room rather than in a corner, is, in my opinion, better than a window tent. A bed on the roof or a balcony is the best of all.

The home record system started by Dr. Pratt is of great value. The use of a thermometer is a guide not only to the physician but to the patient as to whether he or she is doing too much. The objection so often raised that it makes the patient neurasthenic and introspective does not hold good in actual practice.

I believe that this home treatment by means of tuberculosis classes, helped out by day-camps wherever possible, is to be the most important factor in solving tuberculosis problems of small cities and towns in this State.

Dr. A. A. Cushing, of Brookline: That a day camp is a successful factor, in the fight against tuberculosis, is an established fact. My purpose in this paper is to present, in as concise a way as possible, the results of our two years' work at the day camp of the House of the Good Samaritan.

Bear in mind, when comparing our work with that of others, that we have not taken just incipient cases but that we have had the advanced, the incipient and all the intermediary stages.

During the two years 129 patients have been or are under treatment. Our camp, which has been open winter and summer, being the first in Boston if not in the country to do so, is limited in numbers to 25 women or girls. At

times, like the present, we have some patients that come but three days out of the week, thus giving us more, on our record book, than the required number. Just now we have 27.

We have a so-called probation period of two weeks. During this time we decide whether or not the patient means business, and we make a point of impressing upon the patient the great need of systematic earnestness in the fight. Her attendance and perseverance are tested at this time giving us a fair index as to the outlook in her particular case. If she seems suitable we take her as a regular patient and expect of her daily attendance, except Sundays, from 9 A. M. until 5 P. M., faithfulness in carrying out instructions while at home nights and Sundays and a willingness to attend camp, if need be at least six months. Those that fail, during this time, to come up to the mark, must be dropped, not alone for the lesson it brings to the patient, but for the good of the entire camp. An irregular or shiftless patient is a bad influence in any camp. We have had 12 cases that for this reason and others have had to be dropped during the first two weeks. These 12 added to the 27 in the camp at present make 39, which subtracted from the grand total gives us a total of 90 graduates.

These 90 graduates stayed, on a general average, four and one-half months in the camp. The extreme lengths of time varied from 2 weeks to 17 months.

As regards gains in weight, 9 pounds is the general average, the extremes varying from a loss of 9 pounds to a gain of 37.

Every case treated has been tubercular with a single exception and that was a case of chronic influenza. Our diagnoses are based upon physicial signs, sputum examinations and, if these fail, in suspected cases on diagnostic tuberculin.

The cost of such a camp is no small item to be considered. The first year the cost was about 33 cents a day per patient. During the last year milk, as well as other food stuffs, advanced in price, sending our cost of maintenance to 36 cents a patient per diem, making a general average of about 34 cents for the two years. The fact that we are connected with an already established hospital makes our living expenses much lower than they would be if we had to establish and run a place just for our camp.

What are our results as to patients?

Patients discharged		against advice	8	about	8%
"	"	to Rutland	2	"	2%
"	"	unrelieved	35	"	38%
"	"	improved	9	"	10%
"	"	arrested	36	"	40%

Some of the 40% have returned to the ranks of bread winners while others work at home. All the graduates we try to keep track of. The older graduates report to us every month or six weeks, while the newer graduates report weekly and all are carefully watched for relapse. So far but one has relapsed, as far as we know, and she is in camp now. Unless contra-indicated all get tuberculin weekly, and the graduates, when they report, bare their arms for the little dose that immunizes.

The facts are there. They show that it is a struggle that pays perhaps not in dollars but in what is greater, human lives. The story is not all there though. What is most important, to my mind, is the fact that 129 patients have been *educated* in the ways of caring for themselves and in the ways of protecting others. One hundred and twenty-nine patients have been shown the value of food, rest and fresh air in the battle of life. Some have profited, others have seen the opportunities and have allowed them to slip away without once realizing their value. All the patients have been shown how to carry on the treatment *at home*. The disturbing colds and bronchitis of winter and the depleting diarrhœa of summer, with the discomfort of heat, have been battled with and the patient shown how to keep well. Our nurse has gone into the homes and with patience shown the patient, and the family, how to make the most of what is at hand. Thus when a patient is "graduated" she goes, not into different surroundings where she will have to solve the new living problems alone but continues as she was started. A very important problem in the treatment is thus solved, namely, how to keep an arrested case cured.

True it is that we have not cured all, but lives, that could not be saved, have been lengthened, homes have been made cleaner and happier, and the path of life has been smoothed of many of its rough places.

ARTICLE XIII.

THE NECESSITY OF PROVIDING EMPLOYMENT FOR TUBERCULOSIS PATIENTS.

By ALFRED WORCESTER, M.D.
OF WALTHAM.

READ JUNE 9, 1908.

THE NECESSITY OF PROVIDING EMPLOYMENT FOR TUBERCULOSIS PATIENTS.

In India, in preventing the spread of leprosy their custom is to take the one discovered to be afflicted with the disease into the temple, and there hold funeral services. It may be over a mother who is taken from her children. After the funeral services she is brought to the walls of the city and the sentence is pronounced upon her that if she shall ever enter the home of a non-leper, or if she shall allow even her children to enter the cave where she shall take up her residence, she shall be stoned to death. That fearful sentence is sometimes carried out even to this day.

The other day a young physician was about to send his brother who was supposed to be afflicted with tuberculosis to the Tewksbury Almshouse. He is unable to support his brother; and no employment could be found for the incipient consumptive. What is the difference between taking the woman to the walls of the city and sentencing her to be put to death if she enters the house of the non-leper or allows her children to enter her cave, and sending your brother to the Tewksbury Almshouse? What are we to do about it? A man who comes back from Rutland pronounced cured cannot again have his previous employment because of the rule of some corporations that they will not employ men afflicted with tuberculosis. This custom is spreading. Every public meeting where the dangers of tuberculosis are explained results in pauperizing families by

throwing out of employment incipient consumptives who would themselves be far better off if given suitable employment. What shall be done about it? It is our duty as physicians to prevent the spread of disease. And it is also our duty as physicians to relieve those who are afflicted by disease. This in many instances involves finding for them suitable employment. There is not only the economic necessity for this. There is also the therapeutic value for us to keep in mind.

In some sanatoriums patients are given fake employments, such as drawing and painting and basketry simply for the therapeutic advantage. It would be far wiser to teach patients useful trades by which afterwards they might earn their livings. I find that the Jewish Anti-tuberculosis Society, which has its hospital in Colorado for the relief of tuberculous patients, has carefully studied this problem. They report that it is impossible to get the tuberculous Jew to work at agricuture. That cannot be done because he is by nature a mechanic and tradesman and must have work in shops. In Germany, on the other hand, they find no trouble in out-door work and the German land colony seems to me to be nearer what we need here in America. They take the man out, give him a little patch of ground, and let him work half a day or even less, and they pay the man for what he does. I will not detain you longer, but I hope I shall obtain your hearty endorsement of the motion I now make that this general committee of The Massachusetts Medical Society shall take the forward step of asking for a commission which shall include physicians and philanthropists and business men to grapple with this big problem. If we are going to succeed in exterminating the disease something of this sort must be done. Otherwise our efforts will be wrecked on the economic blunder of forcing a large part of our population into unnecessary pauperism.

DISCUSSION.

Dr. A. C. Getchell, of Worcester: When I was asked to take part in this discussion I did not fully understand the scope of this question as it has been presented. I am in full agreement with the general proposition to provide some means to help and look out for arrested cases of tuberculosis.

But we should carefully consider what that means. When I first visited Colorado I was very much impressed with the number of physicians in active practice who had gone there because they had pulmonary tuberculosis. Able men all. Those were the ones who formerly attempted the cure, men and women entirely able to take care of themselves when well. Here however, we are attempting this cure with all classes, the competent and the incompetent, and it is evident that many must be helped in their efforts to earn a living. Any comprehensive plan to effect this will cost money. But it is worth it. It is evident that tuberculosis may be eradicated from civilized communities if the means plainly at hand are employed. Considering the unnecessary destruction of life from this cause, it is not only our plain duty, but good economy, to put those means into operation.

Any scheme for carrying out this plan should have most careful consideration, which may be given by our Council and I most heartly second Dr. Worcester's motion.

Dr. E. O. Otis, of Boston: I can add another case to those which have been cited by Dr. Worcester, and probably other gentlemen present could add others from their experience. I had in my clinic last winter, at the Boston Dispensary, a young man with somewhat advanced chronic tuberculosis, but in a fair general condition, and capable of doing a considerable amount of light work, as he proved by doing a day's work for me. He had obtained a position on an estate at the sea-shore and was performing his duties satisfactorily. One day his employer happened to see an application of his for a pension,—he had served in the Spanish war,—in which his disease, tuberculosis, was mentioned; he was immediately discharged, his employer remarking that he could not take the risk of having his family infected

by him. He came to my clinic and after trying in vain to obtain a place for him in the country, where he could support himself, a place was finally found for him in a consumptive home, where he leads a sort of aimless life; how much better it would have been for him if he could have been placed in the country where he could work to the extent of his ability. The Boston Tuberculosis Association is maturing a plan in coöperation with the Trustees and Superintendant of the Rutland Sanatorium, whereby an investigative or social worker shall be stationed at the sanatorium, with the object of keeping in touch with the patients, after they leave the sanatorium, and, so far as possible finding suitable employment for them, especially for such as could not return to their former employment and environment without jeopardizing their cure. In the Day Camp at Mattapan last year, Dr. Townsend found that out of the 204 patients treated, 134 had received previous treatment at other hospitals, tuberculosis classes, or sanatoria, and 34 were discharged Rutland patients. Moreover, it was found that the breaking down of the cure occurred in a surprisingly short time after discharge from the sanatorium. It is fair to presume that in many cures this unfortunate result might have been averted if suitable employment could have been found for them. The problem is then to aid arrested cases, and those who though not arrested yet are capable of doing a certain amount of work without injury, to obtain suitable, self-supporting employment; the problem is an insistent one and difficult, on account of the fear of infection by would-be-employers, and Dr. Worcester's plea is very timely. In some of the English sanatoria, a preparatory training is given the patients who are in the process of cure, for sustained work after they leave the sanatorium. Such patients are given light work for a short time at first, and if no evil results follow this work is increased in amount and duration until they are capable of doing a fair day's work, thus on their discharge they are in condition to enter at once upon some regular employment which requires sustained endeavor. This process of training obviates one objection so often urged by those who are willing to employ arrested cures, namely, that they want a man who is capable of doing a day's work, and not one who can do only light work for a short time.

If we are to obtain the full economic benefit of the money spent in arresting the cases at Rutland we must so far as possible train and harden for work the patients while completing the cure, we must surpervise them after discharge, and finally aid them in obtaining proper employment under favorable hygienic conditions. I therefore heartily and earnestly endorse Dr. Worcester's resolutions.

Dr. C. E. Simpson, of Lowell: I have very little to say on the subject at present. I have always felt the danger which Dr. Worcester and others speak of, and in dealing with this work in the factories under my care, while trying to surround the patients so that they shall not be a menace to others working with them, I try to give the impression that we are considering their welfare first, and not to create any fear of them or make any additional hardship for the tuberculous cases or those that have a tendency in that direction.

I have found the fellow operatives and managers willing to help them financially, if they go to some institution for treatment, but have no example, as yet, of how they use them when they return for work.

There is only one place that I know of where I have met with the spirit that I wish to avoid, and which has been so strongly set forth by Dr. Worcester. This was in a little shop of about 100 employees having at the time of my visit 24 minors. These minors I am required to inspect. One of them I found had tuberculosis, one tubercular disease of a bone and four others had a bad family history. This is a much worse showing than is usual in my district and I called the manager's attention to the condition as diplomatically as I could, that he would have to look out not to put special strain on these. He said he was not aware he had such a state of things and guessed he would have to "clean some of them out."

On the other hand, there is another phase to this question and when you appoint a commission to find employment for the so-called "cured," it will be necessary to look sharply after them or some of them may make trouble for the project. To cite a case where much damage might be done; in investigating one of my communities, I found a grocer who had been discharged from Rutland as cured,

but is still having considerable expectoration although free from bacilli. He is every day measuring out goods from the room in which he spends considerable of his time, and these goods are to go into the homes of the community. If he remains free from bacilli he may be no particular menace, but he should be closely watched or he may become a source of infection to a large number of homes.

While there may be a few that will need watching, there will be a large number that can be greatly benefited by such a commission. The only way we can reach this subject of tuberculosis is by being a friend to the sufferer. If we are not, and only use him as something undesirable for other people to work with or be near, his friends will protect him, no matter how strong you make your laws; and is not and should not the family physician be the friend of his patient, and could one blame him much if he "believes the case to be something else?"

Dr. W. T. Councilman, of Boston: It seems to me that in many instances there is, on the part of the laity and also the profession, an unjustifiable fear of infection in tuberculosis. It is true the bacillus is the infectious agent and that the patient with tuberculosis discharges the bacilli often in great numbers. But how and under what conditions infection takes place is another matter. Infection does not take place in the simple manner which it does in diphtheria and the acute bacterial diseases. While we cannot let up in our efforts to destroy the discharged bacilli and to keep the well, and especially children, from the chance of their reception, it seems to me utterly unjustifiable to attempt to segregate all cases of tuberculosis irrespective of the nature and the situation of the lesions. There is much ground for the belief that infection, in most cases, takes place in early life and that the disease, as we see it in adults, is the result of the extension of a latent focus which was due to an early and unrecognized infection. If any one thinks of tuberculous infection as occurring simply because the seed and soil are present, he should go over carefully the statistics as to marital and prison tuberculosis.

Dr. I. J. Clarke, of Haverhill: I understand that when patients who have had tuberculosis try to go to work

again they are not allowed to do so. I should like to know whether this is a custom here or whether it is in other cities to refuse the labor of tuberculosis patients. I think it is very important for us to be pretty clear on this point before asking the committee to appoint a commission. I think it is a great deal better to leave it in your hands (Dr. A. T. Cabot) without taking this to the council, by appointing some of this body and asking business men also to take this up. I think this is very proper.

ARTICLE XIV.

THE X-RAY AND FRACTURES.

By FREDERIC J. COTTON, M.D.
OF BOSTON.

READ JUNE 9, 1908.

THE X-RAY AND FRACTURES.

BEFORE the era of the x-ray we seemed to have reached about the limit of our information about fractures, and our fracture lore, based in the main on the wonderful observation of men like Astley Cooper, Dupuytren, Nélaton, Malgaigne, R. W. Smith and Hamilton, had reached that stage of dogma where knowledge is too largely a matter of weighing the opinions of others.

Then came the x-ray, and for about a decade a great many observers have had opportunity to study fractures with the aid of a new and wonderful aid to diagnosis.

The total number of cases so studied has been enormous, and the results of study have in a large measure been made available by publication, for comparison and study. As a natural result we have learned much; our whole knowledge of fractures seems transformed, viewed as it were in a new illumination, and a new generation is growing up who can hardly think of fractures except in terms of the skiagraph, and are impatient with, if not neglectful of, the older means of diagnosis.

For ten years now, we have had pretty good x-rays to work with; the method is no longer new. We should be able to judge now pretty accurately of the additions to our knowledge and skill due to the data accumulated, and to judge in what way the skiagraph may be of most use to us in our routine work.

The addition to our fund of knowledge is probably the most important service of the x-ray.

Increase of Knowledge.

Fractures occur in types, pretty constant types at that. We have of late been able to determine in how far these types are constant, what minor variations they show, how frequently they occur. Previously we had only museum specimens and unconfirmed clinical diagnoses to study. Now we may have for each case a tolerably accurate diagnosis of detailed lesions.

Many types supposed to be rare prove common, for instance, comminuted Colles fracture, fracture of the ulnar styloid, fractures and luxations of the carpus.

On the other hand, lesions once commonly diagnosed are now hardly heard of, as, for example, fracture of the acromion, intracapsular fracture of the neck of the humerus, fracture of the coronoid process at the elbow, uncomplicated dislocation of the radius at the elbow.

We have learned also the frequency with which joint fractures are found as complications of apparently typical dislocations.

There is also a whole series of joint fractures about which we knew almost nothing in the old days. For example, in this list are the elbow fractures so common in children. They used to be classified like those of adults on a geometric basis. Work with skiagraphs has demonstrated clearly that this class really ought to be looked on as epiphyseal injuries. T fractures and fractures of the internal condyle occur in adults, and we used to diagnose them glibly in children as well. We have learned that they do not happen. The lesions of the humerus at the elbow in children are the supracondylar fractures, the separation of the whole epiphyseal end of the bone, separation of the epiphysis of the external condyle (forming a distinct outer half of the whole epiphyseal end), and separation of the little epiphysis of the internal epicondyle, usually entirely outside the joint. These comprise the lesions which in fact occur.

Moreover we have found that the dreaded gunstock deformity is a result of supracondylar lesions only, and has nothing to do (though this was long taught) with fracture of either condyle. These have been among the most notable, though by no means the only instances where our knowledge has been broadened.

Our knowledge of types seems now pretty complete. We have learned what to expect and look for. But this is not all or even the best of it, because in learning what to look for we have also learned how to look.

Personal Training.

Those who have used the x-ray as it should be used, merely as one means of examination, have vastly increased their own diagnostic powers. We have learned new signs, have come to associate certain displacements, certain limitations of motion, certain points of localized tenderness, and so on, with the lesions to which they are appropriate, have in short by means of the x-ray greatly bettered our capacity to do without the x-ray. So it is in cases of carpal fracture—once they were utterly unrecognized, then admitted and studied; to-day we know that after a fall on the palm localized tenderness over the scaphoid usually means scaphoid fracture; that localized thickening added to this, with loss of extension and radial abduction, means displacement of the broken pieces; we hardly need the x-ray at all. So with fractures of the radial head; formerly they were not to be diagnosed at all; now as a result of x-ray study we may diagnose them without needing more than the results of palpation and the testing of the loss of pronation and supination (with flexion and extension intact) to justify diagnosis.

In this way it has been possible for men favorably situated to train themselves to a personal efficiency in fracture work a good deal beyond what was attainable even a few

years ago. Every case in which the diagnosis once made is checked and proved or disproved definitely is worth many not so checked for purposes of education, and it is in furnishing such a check that the x-ray serves its second purpurpose—that of aiding in *personal* education.

So much for the extension of the world's fund of knowledge, and our own education in skill.

Routine Use.

The question of more direct bearing perhaps is what use we are to make of the x-ray in individual cases in practice—in what cases we need it, and when and how it is to be used.

Much nonsense has been written about the necessity of a skiagraph as a preliminary to treatment of any fracture, of criminal neglect in failing so to use it. This is the sheerest nonsense, and I wish to be clear in disclaiming it. As a rule such use is unnecessary and it is often impracticable.

Exceptional Fractures.

There are a few classes of cases in which skiagraphy does necessarily precede any *real* treatment. Let us see what they are in fact. In a fracture of metatarsals by direct crushing for example, we may perhaps be able to guess at the lesions, but can be sure of nothing; until we get the plate all we can do is to put the greatly swollen foot at rest in a comfortable position. Fractures of the scapula, some injuries about the shoulder joint, crushing injuries of the hand and wrist, fractures of the pelvis, a few hip-fractures, some injuries to ankle and tarsus, often do depend on the x-ray for diagnosis, in some cases because of swelling, in some because of the essential difficulty of getting at any serviceable landmarks. In all these cases, however, simple retentive apparatus till we can get an x-ray is adequate treatment for the first one or two or few days. The same may be said of the more obscure and atypical fractures into

and about joints; until we can make our diagnosis we can rest with palliative treatment.

Where we are dealing with obscure luxations, luxations complicated with fracture, or joint fractures with much displacement, the problem is different for these we cannot let alone. The thing to do here is to make our diagnosis as closely as may be, then reduce the dislocation or correct the displacement as best we can—and wait for the plate—recognizing (and telling the patient) that we may have to have a second reduction later. In point of fact the first reduction so made is often all right and no second trial is needed.

The cases where an *accurate* diagnosis is essential to reduction of *gross* displacement are fortunately limited so far as I have seen to a few luxations with or without fracture in the tarsus and foot—a very trifling percentage of cases.

Other threatening conditions like separation of the femoral epiphysis at the knee, Pott's fracture by inversion with great displacement, etc., can be reduced at least accurately enough to avoid the dangers of delay even without knowledge of exact details.

From this it will appear that I am no thorough-going believer in the necessity of a primary x-ray, even in the classes just cited. It is well that such early x-rays are not necessary for they are often unobtainable, under conditions of practice as they exist.

Routine Fractures.

Now as to the run of fractures and luxations—the routine cases coming into our charge; as we have said, the great majority fall into perfectly well recognized classes. Aided by the skiagraph we have evolved more precise methods of differentiating types than we used to have.

I maintain firmly that in the great majority of cases a

properly trained surgeon can make his diagnosis so far as *practical* details go about as well as without the x-ray. If he has not the skill so to make a diagnosis, he is unlikely to be greatly helped by x-rays. Those of us who have used the x-rays most know best how easily one may be misled by this as by any special diagnostic method.

To-day we have, most properly, skiagraphers—specialists—who cannot only take plates but can interpret them. Personally, I doubt if a man who has to have plates interpreted by specially trained men had not better leave fractures to men of special training, for one of the services of the x-ray has been to raise the standard of skill that may reasonably be expected.

I do not mean to decry early taking of x-rays, if convenient, but wish merely to emphasize my belief that they are not a *necessary* routine. Nor do I mean that every Colles fracture is a specialist's job,—only, if the practitioner understands how to recognize direction and grade of displacement, can reduce and can gauge the perfection of his reduction, he is competent enough to do without both specialist and x-ray in routine cases, though he will usually want an x-ray for purposes of *record*.

Not all men are so competent and the practical danger is that men who know neither diagnosis nor treatment, will, with a diagnosis furnished, undertake treatment they cannot handle properly.

Moreover, leaning back on the x-ray makes for neglect of training in manipulation and a progressive loss of competence in this work. This we see in house-officers in the hospitals, and it is the reason, some of us believe, why fracture work in the big hospitals hardly *averages* as good as ten years or more ago. A man who does not manipulate fractures for diagnosis is unapt to manipulate well for reduction, or to be a first rate judge of the results of his manœuvres. And, after all, the preservation of the

general line, the reduction of *palpable* displacements of fragments is what concerns us; fracture treatment is and will be far from attaining exact repositions of broken surfaces.

My belief, then, is that the routine treatment of ordinary fractures should consist of the most searching examination, immediately, or if great swelling is already present, then within a day or two,—an examination best conducted under ether in most cases; that we should thus establish with all possible certainty and detail just what we are dealing with, perform any necessary reduction, and "put up" the fracture.

Importance of X-rays after Reduction.

Then, in a day or two if the patient can walk, but within two weeks in any case (save in femur fractures) we should get an x-ray. An x-ray at this time tells us not only all there is to tell as to what the lesion is, but tells us also how successfully we have dealt with it. And best of all it tells us this at a time when we can still remedy any defects, whether due to wrong diagnosis or to faulty treatment.

And in routine hospital work I find it necessary to interfere later in three cases of bad results of treatment to one where the diagnosis was essentially at fault. This is mainly because so few fractures, relatively, fall outside the recognizable types.

Malposition recognized within a fortnight may almost always be reduced by handling, rougher handling of course than is needful in a fresh case. If through misfortune or fault the skiagraph is not taken till three weeks or more have gone by, open operation may be necessary for any needful corrections. Of this more later. If we do interfere as a result of the x-ray review, we are in duty bound to review our amended result in the same way.

My contention that the time for the x-ray is after, not

before reduction is the rule is based on the following considerations:

(a) Immediate x-rays are hard to get, even in hospitals; any considerable delay in reduction means poorer reductions as a rule.

(b) X-ray examination does not take the place of the time-honored examination in anæsthesia, and this examination properly done with immediate replacement of fragments usually fulfils the immediate indications.

(c) Considerations of difficulty in transportation, expense, and procrastination make it unlikely that more than one x-ray will be taken in a given routine case. This one may best be taken when it will check both diagnosis and corrected position, and will help in prognosis.

Late X-rays.

Now as to late x-rays taken to inform ourselves as to end results. I believe they should be taken only for exceptional reasons. Nearly all cases of fracture call for an x-ray at some time, but this is not the time. In the best cases the x-ray shows abnormal positions of bone ends; in less good cases things always appear far worse than they are. Accurate reposition is almost never attained except by open operation, but it will be years before the laity, including the courts, will appreciate this. What is important is the obtaining of good functional results, an entirely different matter.

The only possible service (except that of record) to be rendered by the x-ray in late cases is the explanation of defective functional results *already observed* with a view to bettering the results by operation or otherwise.

Where this is called for well and good, otherwise I confess I have no interest in having end-result skiagraphs, ordinarily they will tell nothing except what, clinically, are misstatements, or half truths. Remember that the x-

ray does not tell anything except the relation of the original fractured bone ends and surfaces. It shows callus little if at all, and gives no credit for any repair for months after such repair by other tests seems complete.

In the usual run of fractures, then, I believe we shall be wise to use the x-ray in practically all cases, at least for record, repeating it if we may, but certainly using it at such period as will enable us to establish or confirm the diagnosis and to check our treatment. It should not be used *in place of* skilled manipulation for diagnosis, or as the arbiter of end results.

OPERATIVE SURGERY OF FRACTURES.

Next to the service done by enlarging and formulating our scientific knowledge of fractures, perhaps the best service of the skiagraph is that it has opened up a great field of surgery in the way of operative treatment. I say this advisedly, aware of course that many operations on fractures had been done before the time of the x-ray, but anything like the possible precision of work and results of to-day was out of the question, and would be to-day were it not for the skiagraph. And the field of such operative work is increasing very rapidly to-day.

I do not refer here to work on compound fractures—any improvement in handling these has been due to better operative technique, and has nothing do with x-rays. It is the increasing range of lesions, old and new, that we recognize as doing badly, or going to do badly, or having ended badly without operation, that are here to be considered.

As our demand for better results goes on, as operation becomes safer, and as special study of methods and of practical results attainable in this way goes on, we are likely to see wider use of operative measures in proper hands both on fresh cases, in old cases, and still more in cases of threatened, not yet accomplished, poor results.

Without skiagraphy this sort of surgery could never have attained anything like its present level, either as to knowledge of what may be done, or as to the technique of handling the individual case.

Operable cases may be divided roughly into two classes, fresh and old. The fresh cases are those in which fragments are irreducible or cannot be molded into place, or cannot be kept in place after a fair trial, or cases in which involvement of joints, with loose or unmanageable fragments, or lesions of vessels, or more often of nerves, make some remedy imperative.

In these cases our problem is as a rule the restoration of original conditions with exact replacement of the fractured bone-ends with or without the use of staples, nails, wire or absorbable sutures to retain the position. In order to be able to do this we want the best possible data in advance—to be gotten only by careful study of good x-ray plates. Only those who have tried it know how curiously difficult it often is to make out the exact shape of bone-ends in an open wound. Particularly is this true if time enough has elapsed for the formation of great shapeless callus masses and for the establishment of the extreme vascularity of the whole region that characterizes the stage of repair.

The older cases are those in which we have vicious union with malposition of various sorts, variously interfering with function, those in which long delayed union is the reason for interference, those in which we wish to mitigate deformity as such, and finally cases of obstinate involvement of nerve trunks due to stretching, pressure, or involvement in callus.

Each case is a problem in itself, to be solved along lines of operative orthopedics, based on special experience. In most cases we cannot hope to restore original conditions but must study to remove or equalize displacements, remove impeding fragments, restore or make over damaged joints.

Often we do not even try to follow the old lines of lesion but work in and through sound bone to produce our results. The whole region about a fracture is for months tremendously vascular, matted with callus excessively hard to work in because of the confounding of anatomical structures. All work done is under the restriction of care not to injure vessels, or more important still, the nerve trunks. Moreover, while great violence is often necessary and is safe enough, prolonged time of operation brings grave risks of sepsis.

If one does not start with a clear understanding of detailed conditions and a definite plan of action, results are likely to be poor. And such proper understanding needs most careful and skilful interpretation of *good* skiagraphs.

Under proper handling nearly all bad fracture results may be greatly improved and the good results attainable in some cases are astonishing. Because this line of work is still in course of development, and because little has been published yet by those who have done most, the general medical public has no adequate idea of what is possible even now. This is no place to go into much detail but possibly a brief random list of cases of my own, successfully operated on, may be of use in indicating the range of conditions in which we can interfere with good result. Sutures of patella and olecranon, etc., in short, the generally recognized operations, are omitted.

a. Acromio-clavicular luxation, fresh, irreducible, wired.

b. Separation of three ribs from their cartilaginous ends —reduced by open operation—held by pins driven through cartilages into rib ends—held ten days, permanent reduction.

c. Oblique fracture of the surgical neck of the humerus, pressure on the vein with threatened gangrene of the arm —excision of the head, reduction of the head of the shaft after rounding it off; immediate relief to circulation; useful shoulder.

d. Separation of the upper humeral epiphysis in a boy;

great deformity; irreducible. End of shaft found buried in the deltoid, epiphysis stitched in place, perfect result.

e. Reduction of old subcoracoid luxation.

f. Open reduction of a fracture through the tuberosities with fracture of the glenoid.

g. Reduction of old elbow luxations, three cases, one practically perfect, two fair results.

(At the elbow, old luxation is usually accompanied with much new bone growth—some of these bad cases are undoubtedly cases rather for excision).

h. Fresh (reduced) elbow luxation—extreme pain and some paralysis from pressure on ulnar nerve. Internal epicondyle found reduced *into the* joint and a strip of periosteum attached was pulled taut over the ulnar nerve. This was cut, the epitrochlea reduced and sutured in place. Immediate relief of pain and of the paralysis. Perfect result.

i. Elbow luxation (reduced) several weeks old, muscles supplied by ulnar nerve paralyzed, wasted, showing reaction of degeneration. Epicondyle found wedged in at edge of joint, nerve stretched over it very tightly, held by fibrous bands. Condyle removed. Recovery after two months. Perfect result.

j. Supracondylar osteotomy for "gun-stock" deformity. Four cases, good results.

k. Excision of a spur on the lower end of the shaft in front (in supracondylar fracture) limiting flexion at a right angle. Four cases—improvement in all.

l. Fracture of internal condyle with deformity and nonunion; partial excision of elbow.

m. Supracondylar fracture with irreducible deformity and threatened slough—trimming, replacement, suture; good result.

n. Excision of head of radius in comminuted fracture of the radial head limiting motion.

o. Excision of loose fragments and resection of part of radial head for fracture.

p. Replacement of luxated and loose upper end of radius; formation of a false orbicular ligament of muscle fascia and kangaroo tendon; excellent result with rotation preserved.

q. Several cases of refreshing ends of broken forearm bones and replacement for deformity, for non-union, etc.

r. Case of such replacement with dissection of median and ulnar out of scar tissue over the displaced ends. Union. Recovery from paralysis in about four months.

s. A number of cases of open reduction of relatively recent Colles fracture or osteotomy for deformity in old Colles fracture.

t. Resection of fragment in scaphoid fracture with loss of motion. Four cases.

u. Fracture of scaphoid with backward dislocation of distal row of carpal bones; total resection of wrist, perfect result.

v. Similar case, earlier, excision of whole scaphoid, open reduction of luxation, excellent result.

w. Open operation by anterior incision, with fixation in abduction, on three cases of non-union in hip fracture. Union and good functional result in all.

x. Open operation on high femur fracture for mal-union —suture—fair result.

y. Lower leg fractures, various operations for deformity of all sorts and directions. Uniform improvement.

z. Potts fracture with outward displacement with or without backward luxation of the foot. Osteotomy of fibula and of internal malleolus, with remodelling of the joint. Six cases—excellent results with ankle motion in all.

a^1. "Inverted Potts" fracture with deformity, and with non-union of the tibia. Open operation—osteotomy of tibia, refreshing of tibial surfaces, reduction. Two cases, tibial fragment sutured in one, pinned with a drill in the other.

b^1. Two cases of mediotarsal luxation. One after a year, perfect result. One after three years—resection of part of the astragaloid head, reduction. Very useful foot.

c^1. Os calcis—a half dozen fresh cases with obliterated heel and loss of lateral motion of foot, operated by my method of putting in a spindle over the top of the os calcis between tendo achillis and tibia, using this as a grip to break up and reduce the impacted fracture, then holding it in corrected position, and hammering it laterally, the foot on a sand-bag, so as to secure reimpaction.

d^1. Os calcis, extreme valgus, neck of os calcis sawed, heel displaced in and forward. United, improved.

e^1. Several cases of removal of spurs in various sites resulting from os calcis fracture.

The range of remediable conditions is large, and with good x-rays, first rate aseptic conditions, skilled assistance, and experienced operator results are attainable that make this already a fruitful field though still in the early stages of cultivation and development. And on the x-ray and its intelligent use much—most—of its development must depend.

ARTICLE XV.

FRACTURE OF LOWER EPIPHYSIS OF THE TIBIA.

By FREDERIC S. COOLIDGE, M.D.
OF PITTSFIELD.

READ JUNE 9, 1908.

FRACTURE OF LOWER EPIPHYSIS OF THE TIBIA.

When I heard that the symposium to-day was to be upon Fractures I thought it a favorable time to report upon a rather rare case of epiphyseal fracture of the tibia and fibula which occurred to the writer himself. At the age of six years, while climbing a spiked iron fence, he fell and was suspended head downwards by his right foot which was firmly held by the spikes of the fence in its natural plantigrade position. He hung there until he was assisted down, when it was found that the foot was hanging loose and flabby at the ankle. There was little or no pain, nor was there any open wound. The treatment was that for a simple fracture of both bones, and convalescence was in no ways different from the usual cases. The result was pronounced perfectly satisfactory in six weeks, and in a month or so he had practically forgotten about the incident. The shape of the ankle was perfect. In about a year it was noticed that a bunch was appearing on the outer part of his ankle, which grew steadily but slowly larger. For three or four years a brace was worn with pressure on that bony bunch without any effect whatever, except a good deal of pain from the powerful stiff-kneed lever used as a brace. During the period of growth the deformity grew more pronounced together with the increased shortening of the leg, until at 16 it ceased to increase, and has remained stationary since that time. There was at one time some talk of an operation to straighten the leg, but it was not done, and but little difficulty has been experienced from it arising from the tendency

to roll outwards, from the shortening of the leg and from the rather slight impairment of the ankle motions. Here is a picture of the deformity more than 35 years since the accident.

Notice the shortening of the leg, which is 1½ inches; that the fibula with its practically normal growth has shot down much below the tibia and has shoved the whole foot inwards so that the body weight, following the line of the tibial crest, falls even exterior to the fifth metatarsal bone, causing a tendency to turn the ankle.

Notice that the high position of the lower end of the tibia with the lowered fibula makes the axis of the ankle at an angle with the floor rather than horizontal.

Here are a couple of recently taken radiographs showing no signs of the fracture, but they show that the bony bunch on the outside is simply the normal fibula grown down below the end of the tibia and seeming enlarged simply from its being out of its normal place. The tibia has not grown in length at its lower epiphysis, since the accident.

Athough no statement exists of the diagnosis made at the time, I take it that it was a separation of the lower epiphysis of the tibia and probably of the fibula as well; that in healing the tibial epiphysis united with bone and all growth ceased in it, while the fibula uniting in the usual way continued to grow.

The literature of the subject of epiphyseal injuries that I could find is very little. Poland's book on that subject is by far the most comprehensive. McKenzie, of Toronto, describes two or three cases somewhat similar to the present case. Poland states that the usual age for separation of the epiphysis is between 9 and 17 years, and in only one case out of 28 collected of separation of the tibial epiphysis was the age below nine, that one was six years. Moreover the force to cause such an accident is so great that in the majority of cases the broken end of the long bone protrudes through the flesh making it a compound fracture.

I cannot find sufficient data to give an idea of what percentage of epiphyseal fractures are followed by lack of growth in the reunited epiphysis. My own belief is that it is one out of eight or ten. In most of the cases the destruction of the epiphysis is caused by force sufficient to make a compound fracture, or by some cutting force applied directly to the epiphysis, as in accidents with a circular saw or hay cutter as reported. But such force is not necessary, as the present case proves.

We are all familiar with the fact that the long bones grow in length from the upper and lower epiphysis, and we know that in the lower limb most of the growth takes place at the epiphysis at the knee, while in the arm it is the shoulder and wrist epiphyses which are most active. I could not find an exact statement of the amount of growth in the leg due to each epiphysis. From this case, however, who is of normal height, I have the means of judging. His left tibia growing normally from both epiphyses has grown 5 inches from the age of six, while his right tibia growing only from the upper epiphysis has grown only $3\frac{1}{2}$ inches. The relation between the upper and lower epiphyseal growth therefore is $3\frac{1}{2}$ to $1\frac{1}{2}$.

Cases in which an epiphysis has been destroyed by osteomyelitis and has caused cessation of growth, are much more common. Eight years ago I had such a case in which the lower tibial epiphysis had been thus destroyed with a natural prolongation of the fibula downwards. The x-ray plate and the history showed that all active disease was long since at an end. The girl was six years of age and the shortening of the tibia was two inches, the osteomyelitis having occurred in her second year. Knowing, from the subject of this paper, just about what shortening to expect from the age of six until the cessation of growth, and what amount of disability would result, I operated upon the fibula removing a little over two inches well above the outer malleolus and swung the foot outwards into an over corrected

position without much difficulty. Healing was prompt. Two years afterwards I heard from the case by a letter stating that the deformity was beginning and slowly increasing. This however was only what I had expected. I was in doubt then and still am whether or not I should have destroyed the lower epiphysis of the fibula by cutting through it at the time of the operation, thus securing a good shaped ankle except for the shortening of the leg. McEntyre, as his paper written sometime afterwards states, did in his case destroy the fibular epiphysis and he is still in doubt whether if he had left the fibular epiphysis the length of the leg might not have been greater through compensating action of the fibula upon the tibia. I believe that while the compensatory action of the fibula makes a difference of a quarter of an inch in length, not by acting directly upon the tibia but by slanting the axis of the ankle, it is the cause of the worst symptoms of the deformity; the liability of spraining the ankle and the impairment of motion in the joint.

DISCUSSION.

Dr. C. L. Scudder, of Boston: Previous to the employment of the x-ray it was impossible to determine whether the lower epiphysis of the tibia was injured unless the fracture was open or compound. At present an increasing number of these epiphyseal injuries is being recognized. The total number of cases is still small, but it is gradually increasing.

The epiphysis of a bone is in a sense independent of the diaphysis. It has its own blood supply, through a very thick and adherent periosteum. This helps to account for the absence of necrosis following a separation of the epiphysis; the periosteum being so very adherent is almost never entirely torn off.

The importance of separation of an epiphysis is great. If the epiphysis is displaced an unreduced deformity may result which will give rise to a static disturbance, long recognized by the orthopedist as traumatic flat foot.

Will a separated epiphysis unite? Usually it will unite without difficulty. Theoretically at least there should be in any case of injury to an epiphysis a cessation of growth in the length of the bone. Practically the cases in which there is a cessation or retardation of growth are comparatively few.

The cessation of growth on the part of the epiphysis seems to be due to several factors. An interference with the epiphyseal circulation is the important factor. A destruction of the cartilage itself, or a great displacement of the cartilage, may cause a large amount of callus to be thrown out, and this extra amount of callus may so interfere with the blood supply that growth does not occur normally. Whether in any individual instance growth will be interfered with after injury to the epiphyseal cartilage will depend upon whether the growing end of the bone is involved or not. It must not be forgotten that the long bones increase in length more rapidly at one end than at another. If the growing end of the bone is damaged its growth is likely to be checked. The younger the child the greater is the likelihood of a disturbance in the growth of the bone.

I have been able to find records and x-rays of fifteen cases of injury to the lower epiphysis of the tibia at the Massachusetts General Hospital. In some instances the fracture was clean cut, in others it was comminuted. The injury was to the inner side in fourteen of the cases. In but one case was it to the outer side. In only five of the fifteen cases was the epiphysis involved alone. In the remaining ten cases the diaphysis was injured as well. The oldest patient was seventeen years, the youngest patient was nine years old. The age was not mentioned in two cases.

There is little doubt but that sprains and injuries to the ankle may have associated at times a damaged epiphyseal cartilage, a recognition of which would lead to a more careful prognosis.

These epiphyseal injuries are important because the joint surface is involved in the damaged area. Any interference with an articular surface may lead to impairment of motion in that joint.

ARTICLE XVI.

EARLY TREATMENT OF SOME SUPERFICIAL CANCERS, ESPECIALLY EPITHELIOMAS, BY PURE RADIUM BROMIDE RATHER THAN OPERATION OR X-RAYS.

By FRANCIS H. WILLIAMS, M.D.
OF BOSTON.

READ JUNE 9, 1908.

EARLY TREATMENT OF SOME SUPERFICIAL CANCERS, ESPECIALLY EPITHELIOMAS, BY PURE RADIUM BROMIDE RATHER THAN OPERATION OR X-RAYS.*

In 1900 Dr. William Rollins of Boston suggested the use of the radiations from radium salts as a therapeutic agent and put capsules containing radium into my hands, but the salts then obtainable were not powerful enough to be efficient. But to Dr. Rollins is due the credit of being, so far as I am aware, the first to realize the probable value of these radiations as a therapeutic agent.

Nearly five years ago I obtained about two grains (120 mg.) of pure radium bromide and about 100 grains of the impure salts, and soon after published some tests made with them, and clinical results.† The pure salts I have used in tubes or capsules containing 50 mg. and 10 mg. respectively, but the cases I shall describe have been treated ordinarily with capsules containing 50 mg. These have been used both by Dr. S. W. Ellsworth and myself at the Boston City Hospital as well as for my own patients.

Sometimes in the so-called treatment by radium, the preparations used have been weak and inefficient.

Before using radium it seemed to me important to make a study of the beta and gamma rays. My experiments showed that, determined by the fluorescence produced, there was fourteen times as much of the beta as of the gamma rays

* Presented, with a demonstration of more than twenty patients, at the Surgical Section of the Massachusetts Medical Society, June 9, 1908.

† A comparison between the medical uses of the x-rays and the rays from the salts of radium. Boston Med. and Surg. Jour., 1904, cl. 206-209. Notes on radium. Production of the gamma rays from the beta rays from radium; use of radium in some diseases of the eye. Ibid., 559-561.

given off and that the beta rays could be excluded by an aluminum plate of suitable thickness, which however allowed all or nearly all of the gamma rays to pass. My experiments further showed that practically all the beta rays were absorbed by a thickness of one inch (2½ cm.) of soft tissue and that most of them were absorbed by one-half this thickness. Clinical tests indicated that the beta rays had the chief therapeutic value. They do not penetrate deeply, but may eventually reach the deeper portions of a new growth by first destroying the outer portions layer by layer and then attacking the parts that in the beginning were more than half an inch from the surface.

I will describe one of these tests. Miss A. B. had psoriasis and I exposed certain small areas to the beta and gamma rays together for two minutes each; then I shut out the beta rays and exposed other areas on the same patient to the gamma rays only, making the exposures much longer because the amount of gamma rays, as already mentioned, is smaller than that of the beta. These areas therefore were exposed 15, 30 and 45 minutes respectively. A week later the areas that had been exposed to the beta and gamma rays together for two minutes each had improved very much, whereas those that had been exposed to the gamma rays alone showed no change in appearance. Further, all the areas that were subjected to the action of the beta and gamma rays together healed after one or two more exposures, whereas those exposed to the gamma rays alone did not heal.

Before dismissing the gamma rays from consideration, it should be said that they have a value in some painful affections; for example, in certain forms of facial neuralgia. Care must be taken when using them to exclude the beta rays, or the patient is liable to be burned by the latter while subjected to the action of the gamma rays. Burns have been reported from France when patients were treated for neuralgia without excluding the beta rays.

Such a small quantity of radium as 50 milligrammes, or less than a grain, cannot conveniently be used to treat a disease that extends over a very large area as well as can the x-rays. In a general way, it may be said that radium is better adapted to somewhat limited areas rather than to the larger ones, which may be easily covered by the x-rays at one exposure.

The rays from radium issue spontaneously and continuously, and as far as known are uniform as to quantity and quality, so that it is easily possible to give an exact dosage. This is in marked contrast to the conditions which prevail in regard to the x-rays.

It is not my intention to suggest that treatment by radiations from radium—or more accurately by the beta rays—makes other forms of treatment obsolete, but only to indicate that certain of the patients hitherto treated by such remedies as caustics, operation or x-rays, may advantageously be treated by radium instead.

In applying radium the capsule, containing 50 mg. of the pure salt, at the end of a handle a foot or more long, should be held over each area to be exposed for a period varying from one-half to three and sometimes four minutes. With this amount the exposures should be made from one to three times a week, less often after healing has begun, according to the disease to be treated. For the sake of cleanliness the capsule should be covered with a new rubber cot for each patient. No pain accompanies the treatment and there is no sensation except that produced by the contact of the rubber. Improvement in suitable cases follows usually within two or three weeks and sometimes within a shorter period.

I will now present to you some of the results obtained in a series of cases* which have been subjected to the action

* Since this series of cases was tabulated I have been using radium on the tonsil of a patient with thus far satisfactory results—also for a woman with a new growth $1\frac{1}{2}''$ long and more than $\frac{1}{2}''$ in diameter, surrounding the urethra; an operation in her case would mean life-long disability.

of pure radium bromide. Certain of them were exposed to both radium and x-rays, but I have omitted those in which the x-rays probably played an important part. The cases have included lupus erythematosus, lupus vulgaris, trachoma, psoriasis, acne, eczema, keloid, tubercular dactylitis, vernal catarrh, chronic ulcer of the leg, moles, warts, rodent ulcer and epithelioma.

Before considering the results obtained in these two latter diseases, a few words in regard to certain of the others may be of interest.

Radium was not of any service in two cases of *lupus erythematosus*, but a third case seems to be improving.

All the ten cases of *lupus vulgaris* have done well. In two of them a comparison was made between the value of radium and the x-rays by treating one-half of a considerable area with the x-rays and the other half with radium. The radium proved to be more efficient than the x-rays.

In two cases of *trachoma* the results were somewhat encouraging.

Radium has shown itself a useful agent in cases of *acne*, *eczema*, *psoriasis*, *warts*, and *other skin diseases* in which the diseased area was limited.

In two cases of *keloid* of small area, one-half of the diseased tract disappeared when treated by radium more quickly than the other half treated by the x-rays.

There is, I believe, another opportunity for the use of radium which I will only refer to in this paper, and that is the treatment of certain glandular structures. It seems to me that the attempt might well be made to treat adenoids by means of radium.

Let us now take up the cases of rodent ulcer and epithelioma. Of 17 cases of *rodent ulcer* treated by radium in this series, 11 healed, one healed but recurred later, four did not heal, and one is still under treatment. The average duration of the disease in these cases, before treatment was begun, was ten years. I believe that better results might

have been obtained if patients had come earlier and if the radium had been used more vigorously.

Of the cases of *epithelioma* in this series there were 69, and the success that followed the use of radium in this largest and most important group has been the chief reason for the presentation of this paper. The average duration of the disease before treatment was begun was 4½ years. 56 healed, 1 did not heal, 4 are under treatment, and 8 discontinued treatment, but these last, with one exception, were all doing well at that time.

As the length of time that has elapsed after healing is a very important consideration in estimating the value of a remedy, I should state that of the 56 healed cases 23 have been well for two years or more, 9 of these 23 for more than three years, and 2 for more than four years. Recurrence took place in two of the twenty-three cases, in one a year and in the other 2½ years after healing, but yielded to further treatment.

These 69 epitheliomas do not include pre-epitheliomatous growths. They are divided as to sites of the disease as follows:—

	TOTAL.	HEALED.	NOT HEALED.	UNDER TREATMENT.	DISCONTINUED TREATMENT.
Lower lip	14	11*	—	1	2
Lid	9	6	—	1	2
Face	24	20	1	1	2
Auditory Canal	1	1	—	—	—
Ear	1	—	—	—	1
Hand	1	1	—	—	—
Nose	19	17	—	1	1†
	69	56	1	4	8

* In one of these eleven lip cases, a gland, just under the angle of the jaw, became somewhat enlarged four months after the lip had healed, and has been removed since this paper was read. Prof. F. O. Mallory reported it to be cancerous. There has been no recurrence on the lip. This case shows that the action of radium was local, and indicates the importance of its early use. When desirable, radium may be supplemented by suitable treatment of the neighboring glands.

† A feeble man, 76 years old, who died suddenly while under treatment after being out on a very cold day. All the others, except one, were doing well when they discontinued treatment.

Let me describe one case. This patient had a typical epithelioma of the lip about ½ inch in diameter in the mucous membrane of the lower lip not far from the median line. It had begun slowly with a little roughening and irritation of the mucous membrane; this spread and later the disease progressed more rapidly. Various powders and other simple forms of treatment had been used for more than a year after the first symptoms appeared. At the end of this time the patient came to me and was treated with radium and all other treatment was omitted. The exposures were given twice a week for six weeks. Three days after the first exposure the crust came away leaving a rough surface containing holes as if roots had been drawn out. A week later these openings had filled up and the induration had disappeared. After ten days the ulceration was less indolent in appearance. After fourteen days there was a clean, oval ulceration with a narrow, contracting circle of scar tissue around the edge. After seventeen days the appearance seen was that of a healing ulceration and the induration had nearly if not quite disappeared. All this improvement took place after only five exposures of three to four minutes each and was so rapid that some improvement was noticeable at every visit. When healing was complete, at the end of six weeks, the mucous membrane of the lip where the epithelioma had been did not differ in appearance from that of other parts, but there was a slight depression as a result of the loss of substance.

On the other hand, the rays from radium may at first make the diseased area look worse. For example, Miss H. had a wart, on the side of the nose, which had been torn off. Irritation and ulceration followed. The application of radium caused an increase in the redness, swelling and discharge. The treatment, however, was continued and after a few exposures the discharge and swelling subsided, the induration disappeared, and the ulcer healed rapidly. It seemed

as if the indurated base had to be got rid of before healing could take place.

One case of epithelioma of the face yielded to six exposures of one to two minutes each. This case was of a year's duration only when treatment with radium was begun.

In epitheliomas of short duration the *improvement* seems to be prompt. By this I mean the sensation and soreness diminish or disappear and the diseased area becomes less congested and less aggressive and the disease appears to be arrested in its progress in two or three weeks, and sometimes less. When we consider:

1st, that epitheliomas may begin to improve promptly,

2d, how well they have healed when properly treated with a suitable amount of pure radium bromide, and

3d, that speaking generally epitheliomas that have not been operated on seem to do better when treated with radium than those upon which an operation has been performed, and then radium treatment begun,—I believe that radium should be employed in early epithelioma before any other treatment is used.

Anything which might give rise to an epithelioma, such as a wart which has been irritated or torn off, or a small intractable spot of apparent eczema, or other starting points of epithelioma which do not heal in a few weeks or months should be submitted to treatment by radium.

It is interesting to note that surgeons and their relatives have come for this painless treatment rather than submit to operation, and thus far they have done well. It is probable when patients realize that there is a painless remedy, they will submit themselves for treatment earlier than was done by those in the series which I have briefly outlined (average duration in the cases of rodent ulcer 10 years, epitheliomas 4½ years), and we may hope too that they will come for treatment for such things as do not heal readily and might lead to some serious growth. Under such cir-

cumstances the results should be even better than those which I have thus far had. But even now unless one has watched such a series of epitheliomas as I have described, and seen so many of them heal and in many cases leave so slight a scar that the site of the disease is not easily recognized, it would be difficult to believe that such benign results could follow the use of a remedy that cannot be seen or felt.

Treatment by radium should be begun early and nature must do her share. Healing under the most favorable circumstances may take place after less than a dozen exposures, in other cases a much greater number will be necessary, as in treating old and feeble patients or patients with a poor circulation the remedy must be used cautiously in order to do good only. In such patients healing goes on slowly, or they may have so little vitality that they do not respond, so that after the radium has done its work of destroying the diseased tissues healing does not take place.

Experience and judgment will guide the physician in giving the amount necessary to cause healing without overexposure which would result in irritation and a burn, and with care no harm will be done. At the same time, if radium is timorously used good results will not follow or will come only after unnecessarily prolonged treatment.

CONCLUSIONS.

1. The radiations from radium are uniform in quality and quantity and thus this remedy has a great advantage over the x-rays in efficiency and safety.

2. The gamma rays from radium are useful in some cases for relieving pain. They have great penetrating power. When they are used as an analgesic the beta rays should be excluded or the patient may be burned, partly because the proportion of gamma rays is so much smaller than that of the beta rays that the exposure must be much

longer when the gamma rays are used, to make them effective.

3. The beta rays from radium are the useful rays in the treatment of rodent ulcers, epitheliomas, and other superficial diseases. They can be applied in the mouth and other cavities.

4. Radium should be used early; and in suitable amount and strength. The treatment is painless and leaves the least scar.

5. Radium does not produce as good results in cases in which an operation has first been done or scraping, caustic, or any other irritating treatment has been used, or the x-rays have been applied.

6. Improvement follows the use of radium more promptly in many cases than the use of the x-rays, and the total duration of treatment by radium, though sometimes long, is much shorter than with the x-rays. In some cases success has followed the use of radium where treatment by the x-rays has failed.

7. A surprisingly large proportion of external cancers, especially epitheliomas, have healed and remained healed for some years under treatment by radium, and my experience thus far indicates that for certain cases of new growths it is a better remedy than those previously at our command.

8. Recurrences follow all methods of treatment, and radium is no exception, but so far as present experience goes this is unusual and they have yielded to further treatment by radium.

9. The disadvantage of radium is its cost to the physician.

DISCUSSION.

Dr H. L. Burrell, of Boston: It gives me a great deal of pleasure to open the discussion of Dr. Williams' paper. My attention was first attracted to the subject of the radium treatment of epithelioma and lupus vulgaris by some cases that had been treated by Dr. Abbé. Some of the results were printed last autumn.

I was talking with one of my medical friends one day and I noticed that there was an epithelioma near the inner canthus of his eye. I thought of speaking to him about it but did not. Five weeks later I met my friend and to my amazement the epithelioma had vanished. He had been under Dr. Williams' treatment and it was a brilliant result.

I am very glad that Dr. Williams has given the credit and placed it where it is due. Personally I was not aware that Dr. Rollins was the first one to suggest the use of radium for that purpose. When I looked at the title of Dr. Williams' paper, as a surgeon I was greatly inclined to come here with the definite purpose of resenting that title. I have been and I am, until we are sure as to our results, a strong advocate of early and immediate operative interference with anything that is suspicious of a malignant character. The preliminary stage of treatment, if I may so express it, which Dr. Williams has introduced by the use of radium is to me a new development.

During the winter Dr. Williams was good enough before my clinic at the hospital to bring a series of cases, some of which are here to-day. The results are brilliant. There can be no question as to the results. The only question which comes into my mind is, "Was the diagnosis in each case made from a scientific stand-point?" It should be established by a microscopic examination. That is not necessary for the benefit of the patient, but from a scientific stand-point it should be established on that basis.

I came here prepared to protest. I came here prepared to say that an early and radical operation is the only treatment of cancer that can be depended upon. Dr. Williams' conservative statement that cases of suspicious superficial growth should be under radium treatment for two or three

weeks I entirely agree with, but if we could only all have the experience that Dr. Williams has, if we had the discrimination, the good judgment that he possesses in eliminating cases that should have been sent to the surgeon at once! Dr. Williams has discrimination. If we all of us without discrimination should use radium, I should be very loath to say that it was preferable to the use of the knife. But certainly we have by this means a brilliant method of treatment in certain selected cases.

Upon the deductions that Dr. Williams has drawn I have not a word of comment. I entirely agree and personally I feel that we are indebted, Mr. Chairman, to Dr. Williams for his early work on the treatment of these cases with radium.

Dr. G. W. Gay, of Boston: For two or three years I had a small spot on my nose a third of an inch in diameter which was covered with a thin scab. While it never bled nor suppurated, yet it had the appearance of a mild epithelial growth which slowly increased in thickness, not attached to the bone. Upon consulting Dr. Williams I was surprised to have him recommend radium instead of the x-ray.

He produced a piece of heavy lead pipe about a foot in length from which he removed a wire having upon one end a capsule the size of a large bean. On covering this capsule with an ordinary rubber cot he applied it lightly to the spot for three minutes. No sensation whatever attended the application. An hour later the spot began to itch, persisting for some hours. Similar exposures were made with like results at intervals of a week, when after the fifth treatment, the thick scab dropped off leaving a perfectly healthy skin which has persisted for several months and bids fair to so continue indefinitely. The treatment and the results were ideal.

In relation to Dr. Burrell's very proper warning it may be said that for the present there is little danger of the indiscriminate use of the bromide of radium from the fact that it costs about five thousand dollars a grain! With my present knowledge of Dr. Williams' brilliant work I should not feel justified in recommending operative or other measures for these superficial growths, if it were possible to ob-

tain the radium treatment. Like all powerful agents it is to be used with great care and judgment, but when so used, the results in many instances leave nothing to be desired in the method and its application.

Dr. E. A. Codman, of Boston: No one appreciates more than I do the untiring energy which Dr. Williams has given to this subject. When the x-ray was first discovered, I recall very well that Dr. Williams showed the first cases here in Boston of cures of epithelioma by the x-ray. At that time I used the x-ray myself and cured a few cases with it; others became worse and came to operation. I have seen x-ray cases of Dr. Williams which are just as brilliant as these radium cases. These are undoubtedly cured—some of them. But I feel that I can say this and feel very sure of it: that the x-ray so far has done far more harm than good to cases of cancer and epithelioma. I say this advisedly. There are early superficial cases of epithelioma and cancer in the skin which can be cured by the x-ray; but they are not the dangerous types of cancer. The trouble is in giving these cases to the public, for each patient hopes that his is a superficial case, when in reality it has invaded the deeper tissues. Those that have got well with the x-ray or radium would have got well anyway with the knife. Certainly many cases of this type exist many years without any serious trouble.

There have been a great many other cases which needed the knife and needed it badly, and by attempting treatment by the x-ray have lost fatal time. Within two weeks at my office I have seen two cases of epithelioma of the tongue, both of which had frittered away the hopeful opportunity with the x-ray.

Now, I feel that some of these cases which Dr. Williams has shown are brilliant cures, and still I must say that I believe on the whole the x-ray and radium have done more harm than good, because the loss of time in unsuitable cases has been of more consequence than the matter of unsightly scars the knife produces in favorable cases. Quite a few of the cases coming to the Massachusetts General Hospital for operation are cases which have had the x-ray over and over again. Those very cases operated on early would

have been cured. I have no doubt that any surgeon of experience could show a large number of superficial cancers such as those shown here which he has cured by the knife. Do not let us be misguided by the use of radium. I do not feel that everybody can be trusted with it. Certainly not in cases where the cancer is below the epidermis. It is time enough to use it after the knife.

Dr. Williams: As I stated before beginning my paper, the most important part of what I have to present is the photographs taken before and after treatment and the twenty-odd patients who have kindly come here on this hot day. The number would have been larger, but some of the letters asking them to be present were returned in the mail, showing they had not been received. From these patients you may form your own opinions as to the importance of this new remedy. One of them has a scar of considerable size behind the ear due to an old epithelioma which was healed by radium. There is also an epithelioma higher up on the same side of the head; this is not a recurrence, but a new area which is also yielding rapidly to radium treatment.

From the study of the physics of the x-rays and of radium Dr. Rollins intelligently and wisely argued that the radiations from radium would probably be of service as a therapeutic agent.

In some of my patients the diagnosis was made by means of the microscope, but I soon became convinced that out of due regard to their welfare it was not right to irritate the growth in any way and now a microscopic examination is not made. As a rule the diagnosis presents little difficulty to those who are familiar with these cases.

In a number of patients radium has done well where the x-rays have failed, but radium does not have its best opportunity when used on such patients.

With regard to the value of radium, it is 100,000 times as costly as gold.

As regards the question of the use of radium in cases which are serious—the cases I have presented were serious —the so-called pre-epitheliomatous cases were not included. If radium is not of service in serious cases, why have not more of those I have presented failed to heal? Further-

more, the more active and rapidly growing cases have yielded more readily than those of the indolent type of slower development. Early treatment is even more important in the cases which might prove to be serious.

With regard to patients who have had x-ray treatment, although this is not the subject of the paper, and then come to the surgeon for operation later, it is always instructive to see patients who have been treated by someone else and by a different method. For example, a patient who had been operated on a second time for a sarcoma after an interval of three months, the diagnosis was made by microscopic examination, came to me about six years ago for treatment by the x-rays in preference to a third operation. The patient is still well. There is no doubt that harm has been done by the x-rays, as by all powerful remedies. It is a very difficult method to carry out properly. I have naturally seen far more recurrences after operation which have come for help from the x-rays than have most surgeons. These patients are sometimes the saddest part of an x-ray clinic. To my mind the assistance which the x-rays may afford in relieving pain and in prolonging the lives of patients who have been operated on once or twice, or even five or six times, without getting rid of the disease is most striking evidence of the power of the x-rays.

I do not advocate radium in all cases, as I have already indicated, but if used in suitable ones I believe fewer operations will be needed. It is well to remember that at the start even a dangerous cancer is small.

ARTICLE XVII.

BURSITIS SUBACROMIALIS, OR PERIARTHRITIS OF THE SHOULDER JOINT.

(SUB-DELTOID BURSITIS.)

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OF BOSTON.

READ JUNE 9, 1908.

BURSITIS SUBACROMIALIS, OR PERIARTHRITIS OF THE SHOULDER JOINT.

(SUB-DELTOID BURSITIS.)

THE cases which are to be discussed in this paper are by far the most common lesions of the shoulder joint. It is the writer's experience that more patients seek hospital treatment for lesions involving the subacromial bursa than for all other lesions of the shoulder joint, including tuberculosis and fractures, added together. Not only is this true but it is also true that more cases of subacromial bursitis seek hospital treatment than all the cases of the supposedly more common forms of bursitis such as "miner's elbow," "housemaid's knee" and "weaver's bottom." In those clinics in which these statements are apparently not true it will be found that these cases are passing unrecognized under the diagnoses of brachial neuritis, periarthritis, muscular rheumatism, circumflex paralysis, contusion of the shoulder, fibrous ankylosis, gout, rheumatism and other vague terms.

If one seeks information on this subject from the literature, he must grope among the articles on Periarthritis and Fibrous Ankylosis. He will find the clinical picture of the severe adherent type of cases which I have spoken of as Type II, described again and again under the title of Periarthritis. An article by Duplay (1) in 1872 describes in detail with characteristic beauty of diction the clinical picture of these cases and gives a good general explanation of the pathological condition. It is a pleasure to see the accuracy of his observation; his perfect description of the

clinical condition can never be improved on. Putnam in 1882 has given us an admirable description of the same class of cases. Douglas Graham in his Treatise on Massage, p. 372, written in 1884, expresses in a nutshell the understanding of the subject at that date. "Periarthritis of the shoulder-joint, a subacute or chronic inflammation of the subacromial bursa and of the loose areolar tissue under the deltoid, with thickening and the formation of adhesions entangling nerves and tendons, hindering motion, and setting up neuritis, while the articular surfaces are in a normal condition, is a very stubborn affection."

This definition, although somewhat general, expresses a clearer conception of the condition than any other I have seen, until the appearance of Küster's paper in 1902, which gives us the first clear explanation of the mechanical importance of the bursa. Even Küster apparently considers the cases of subacromial bursitis exceptional rather than common, for he only makes a diagnosis when *external rotation is free*. This error accounts for his not appreciating the frequency of this condition, for in most cases *external rotation is not free* (see Figs. 3 & 4). My own work on this subject was done before seeing Küster's paper, which however antedates mine by four years, and contains most of the important observations which I made. It is not my intention to give a bibliography of this subject, because Küster's paper opens a new era in it, and Duplay's monograph represents the previous knowledge of the subject. Papers by Painter and Baer which have followed mine will be discussed later.

In May 1906 I published a paper on "Stiff and Painful Shoulders," (5) in which I unfortunately used the term Subdeltoid instead of Subacromial Bursitis.* It has been a great

* Bursitis Subacromialis is the name used by Küster. I regret that I did not use this name for the title of my former paper and I hope that the next writer on this subject will adopt Küster's name. His paper is the only one which I have ever seen which shows at all an adequate appreciation of the function of this bursa.

pleasure to me that this paper has received attention from other surgeons, both here in Boston and in other cities. Many questions have been asked me in regard to it and it is in part to answer these questions that the present paper is written. It is in a way a supplement to the other, and is intended to make clear some of the points which were obscure in the former one. Another reason for my making a report on this subject now, is that during the summer of 1906 my colleagues at the Massachusetts General Hospital not only in the surgical, but in the orthopedic, nerve and medical departments, were kind enough to turn over their shoulder cases to me for study. The experience has been very valuable to me and I feel that in some measure it is incumbent on me to make a report of this experience to the other gentlemen who were kind enough to allow me the temporary use of their material. Thanks to their kindness and from cases in my private practice I now have complete notes on 75 cases of lesions of the subdeltoid or subacromial bursa. Besides these, I have seen a large number of other cases, on which, during the pressure of my regular work at the hospital, I have not had time to take careful notes.

ANATOMY.

In reviewing my former paper there are one or two points in the anatomy of the shoulder which I perhaps did not dwell on enough. I did not make it clear enough that the subdeltoid and the subacromial bursa are one and the same thing. Some anatomists have described two bursæ, but my experience is that careful demonstration shows that there is usually but one. Subacromial bursa is really the better name, for in abduction the whole bursa is subacromial. The subdeltoid bursa is the portion which in adduction lies beyond the edge of the acromion under the fibres of the deltoid. The relative size of the two portions will, of course, vary with the position of the arm, for the tuber-

osity moves in and out carrying the floor of the bursa with it. (Figs. 1 and 2, 3 and 4.) In some rare cases the subdeltoid portion may be separated from the subacromial portion by thin septa of serous membrane which move freely in the bursæ and as explained in my former paper resemble the nictatating membrane in a bird's eye.

Fig. 1.

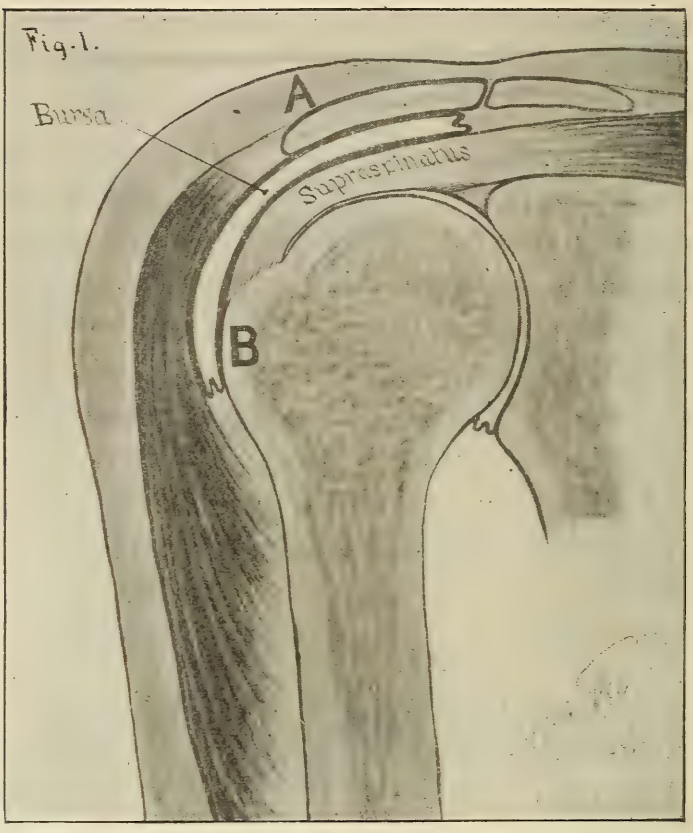


Fig. 1 is a diagram from a frozen section. Notice the deltoid and its origin from the edge of the acromion. Notice the subdeltoid or subacromial bursa with its roof made by the under surface of the acromion and by the fascia beneath the upper portion of the deltoid. Its base is on the greater tuberosity and the tendon of the supraspinatus which separates it like an interarticular fibrocartilage from the true joint.

It is well to bear in mind that the base of the bursa is firmly attached to the top of the tuberosity and the tendinous expansion of the supraspinatus, and that the roof is firmly attached to the underside of the acromion and coraco-

acromial ligament. It is the loose periphery of the bursa which is movable and which rolling on itself allows the roof to slide on the base. This is true of bursæ in general.

I should have also accentuated the size of the bursa. I said that it was roughly the size of the palm of the hand. Baer and Painter who have since written on the subject, speak of it as the size of a half dollar. Perhaps I have

Fig. 2.

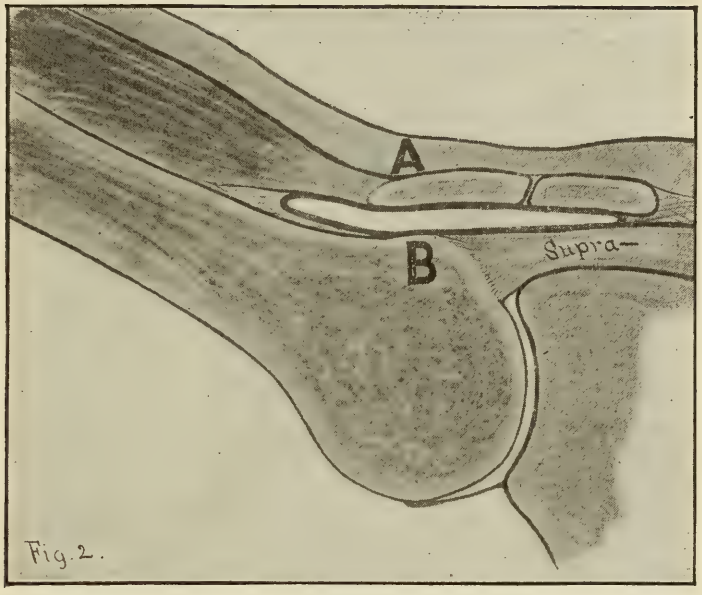


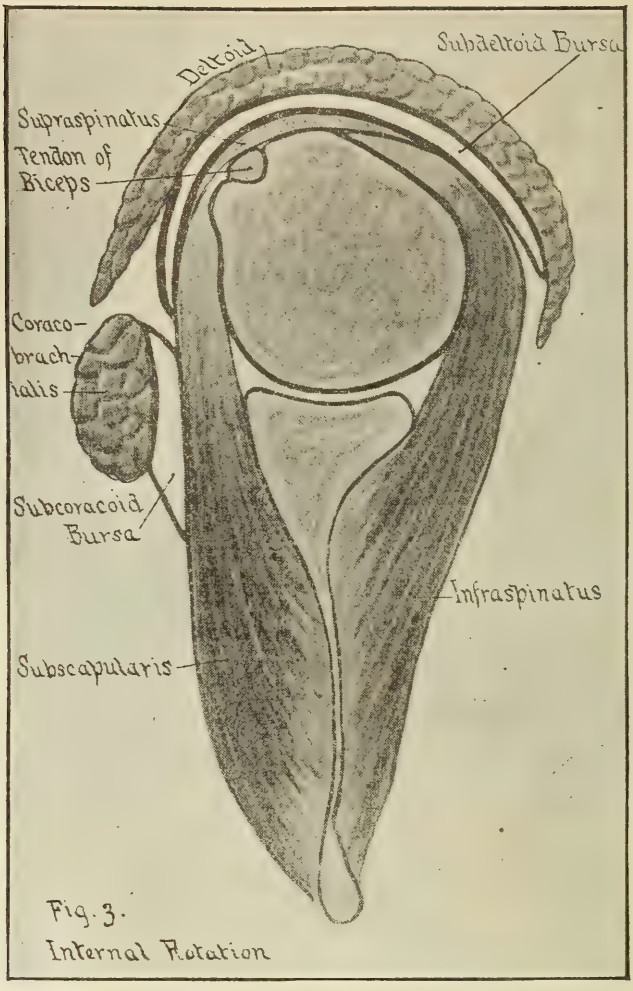
Fig. 2 illustrates the condition which would be found in abduction, the tuberosity having passed under the acromion and the point (B) having passed the point (A). The elastic deltoid has taken up the slack at one end and the supraspinatus at the other. It is obvious that the floor of the bursa, as it lies on the tendon of the supraspinatus and the tuberosity, must be a smooth, even, rounded surface. As a matter of fact, the first time one cuts into the bursa one is almost startled to find how much the floor of it looks like the cartilaginous surface of the bone!

It is obvious that if the surfaces of the bursa between the points A and B in Fig. 1 were adherent, it would be impossible for the joint to pass into the position shown in Fig. 2.

magnified it, certainly they have minimized it. One of the smallest specimens I have measures 2½ inches in diameter, and I have seen many that are larger. A silver dollar is 1½ inch in diameter. The bursa between the coraco-brachialis and the subscapularis, which frequently is a part of the subacromial bursa, but may be separate, is just about the

size of a half dollar. The other bursæ which exist about the shoulder joint are roughly the size of a silver quarter.

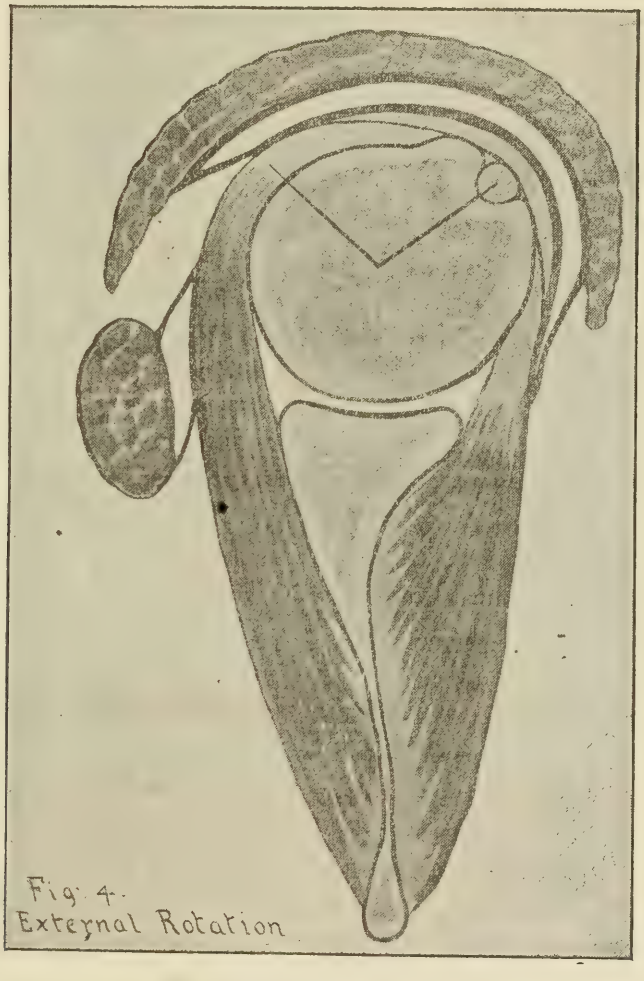
Fig. 3.



Figs. 3 and 4. A diagrammatic representation of a horizontal section through the head of the humerus to indicate the lateral extent of the bursa and the necessity for its existence to allow the greater tuberosity to rotate beneath the deltoid. Notice also how the tendon of the infraspinatus is stretched around the head of the bone in internal rotation and how the tendon of the subscapularis is stretched around the head in the opposite direction in external rotation. This stretching occurs not in the tendons themselves, which are very short, but in the muscles which by their construction take up the slack of the capsule of the joint. In fact, the capsule of the joint is really made up of the tendons and muscular bellies of these short rotators. It can be easily imagined how a simultaneous spasm of these muscles would lock the joint, for, in the normal motion one must relax as the other contracts. Notice also the cross section of the coracobrachialis and the necessity for the subcoracoid bursa which lies between it and the subscapularis. Since the two muscles work at right angles to one another the bursa is indispensable.

I purposely do not dwell on the anatomy of these other bursæ because I believe they are relatively unimportant. Undoubtedly inflammation occurs in these other bursæ but it can never be of the paramount importance that inflammation in the subacromial bursa is, because of the mechanical importance and exposed position of the latter.

Fig. 4.



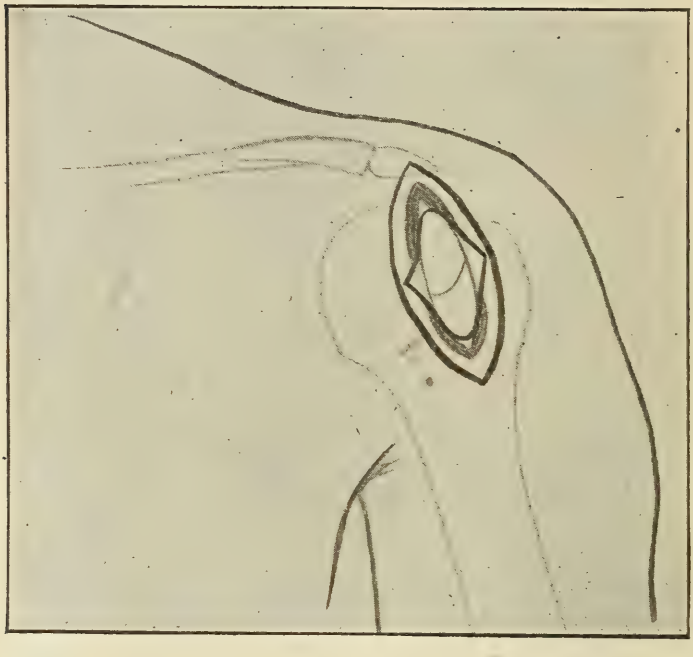
For legend, see Fig. 3.

To demonstrate the subdeltoid or subacromial bursa the following method is the most satisfactory I know, and is the same method used for operation in the living. A fresh cadaver at autopsy is a more satisfactory subject for

demonstration than the frozen and dried specimens usually found in a dissecting room.

Flex the elbow to a right angle and hold the humerus at the side in a position midway between internal and external rotation of the humerus, *i. e.* with the axis of the forearm pointing directly forward. Find the external lip of the bicipital groove and make over it a vertical incision two inches long from the edge of the acromion downward. (See Figs. 5 and 6.) Separate the fibres of the deltoid as

FIG. 5.



Showing incision used for demonstration of the bursa. For enlargement of same, see Fig. 6.

the fibres of the rectus are separated in a laparotomy until the cellular tissue is clearly exposed. With the same care as is used in entering the peritoneal cavity lift up the cellular tissue with two pair of forceps and incise between them. When the serous lining of the bursa is nicked, carefully enlarge the incision upward and downward and clamp the edges of the serous lining on each side. Now hold these

clamps as retractors to open the wound and have an assistant rotate the humerus so as to make the base pass to and fro beneath the incision. Then pull down hard on the arm and the air will rush in to the subacromial portion. A finger

FIG. 6.

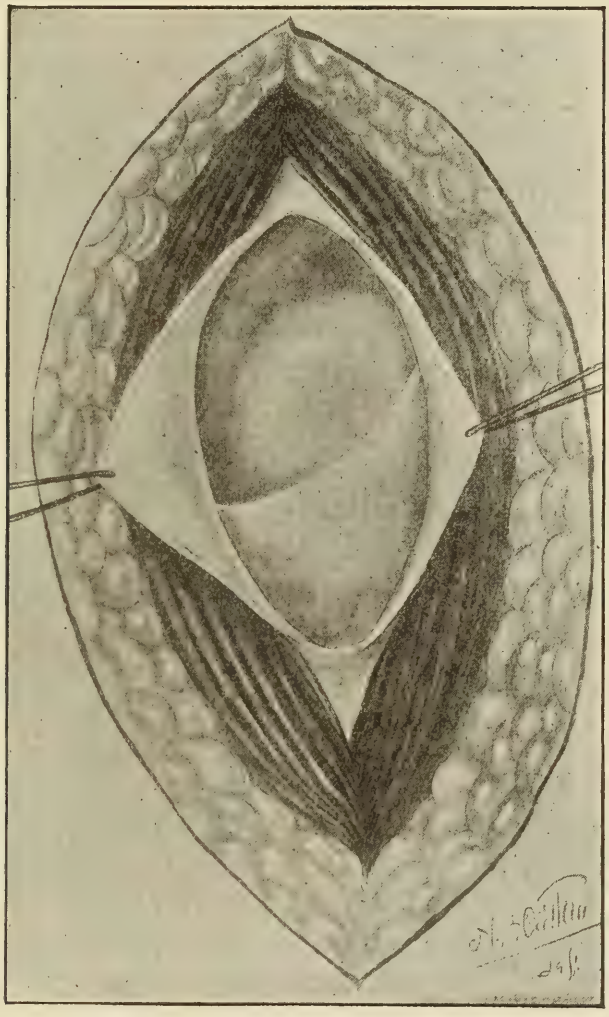


Fig. 6 illustrates the appearance when an incision into the normal bursa has been made. The extremely thin superior layer of the bursa is caught with sutures and the smooth shining base is seen in the middle. The base can be moved by rotation of the arm without moving the superior layer. In the lower portion of the wound is seen one of the "nictitating folds."

may then be introduced into the cavity of the bursa between the tuberosity and the acromion.

Any method of demonstration depending on dissection

after the injection of solid or semi-solid substances into the bursa under pressure is apt to be deceptive, because normally the bursal surfaces are closely apposed and when injected the increase in the third dimension must be compensated by a corresponding diminution in diameter and circumference.

Motions of the Humerus.

When I speak of external rotation of the humerus I mean rotation of the humerus itself. This is best tested in the following manner. Flex the elbow to a right angle, hold the elbow to the side and carry the forearm outward, still keeping the elbow at the side. In a normal person the axis of the forearm in complete external rotation will stand in the sagittal plane. Internal rotation is tested in much the same way with the elbow flexed, but since the body would interfere with complete internal rotation beyond the sling position, the hand must be placed behind the back to get into the extreme position. Care should be taken meanwhile to follow the motion of the scapula which is capable of a considerable amount of rotation.

By abduction of the arm, I mean raising the arm directly upwards from the side of the body in the sagittal plane. This may be done either in internal rotation or external rotation. Abduction in internal rotation cannot be carried within a considerable number of degrees as high as it can in external rotation. As I have previously explained, this is due to the shape of the head of the humerus. This fact may be tested by endeavoring to raise the arm with the elbow flexed in internal rotation, as high as possible; if it is then rotated outward it may be raised still higher. Conversely it may be tested by raising the arm to as nearly a vertical position as possible, then flexing the elbow without moving the shoulder: it will then be found that the humerus is rotated as far outward as possible: it cannot be rotated fnrther outward, but may be rotated inward.

By elevation of the arm, I mean practically the same thing as abduction, except that elevation implies a departure from the sagittal plane toward the frontal plane. As far as I know, there is no anatomical name for this motion. It is really a combination of abduction and external rotation.

In explaining this subject to students I find that many do not realize that during abduction of the arm the greater tuberosity actually passes beneath the acromion and coracoacromial ligament. They appear to think that the motion is limited by the impingement of the tuberosity on the acromion. I think this false conception is due to the usual method of articulating skeletons used for anatomical study, which does not allow the tuberosity to pass under the acromion.

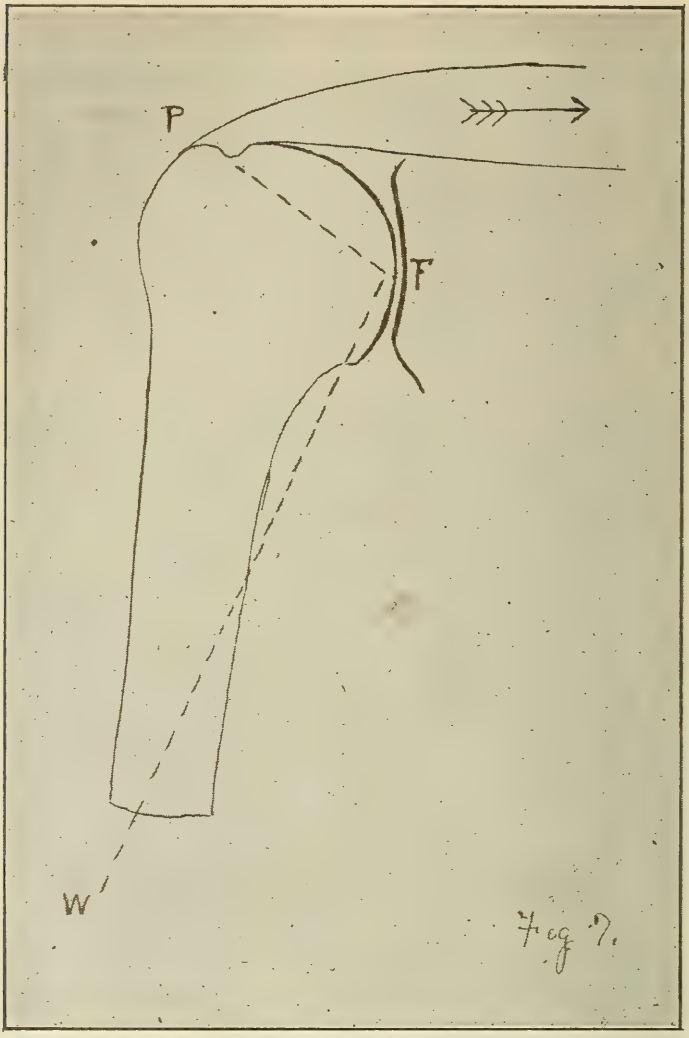
A point which I did not accent sufficiently in the former paper, was the function of the supraspinatus in abduction and elevation of the arm. The diagrams (Figs. 7 and 8) illustrate the importance of the supraspinatus as an abductor. It is generally supposed that the deltoid is an abductor of the arm, but I believe it can be shown that the deltoid is not an abductor unless accompanied in its action by the supraspinatus. The deltoid alone tends to press the head of the humerus up under the acromion process.

A consideration of Figures 7 and 8 will demonstrate the importance of the function of the supraspinatus in abduction of the arm. In Figure 7 is shown how the supraspinatus applies its power on the short arm of the lever P. F. A mechanically perfect sliding fulcrum is obtained on the glenoid.

In Figure 8 is analyzed the application of the power of the deltoid to the point O. If the power were applied by the outer fibres O—P a fulcrum could not be obtained on the glenoid but would be obtained on the acromion, which, since it is not provided with articular cartilage, is obviously unfitted for this function. On the other hand, if the power

were applied by the inner fibres O—P′, the glenoid could only act as a fulcrum in adduction. The resultant of the action of all the fibres tends to drive the head of the bone directly upward under the acromion.

Fig. 7.

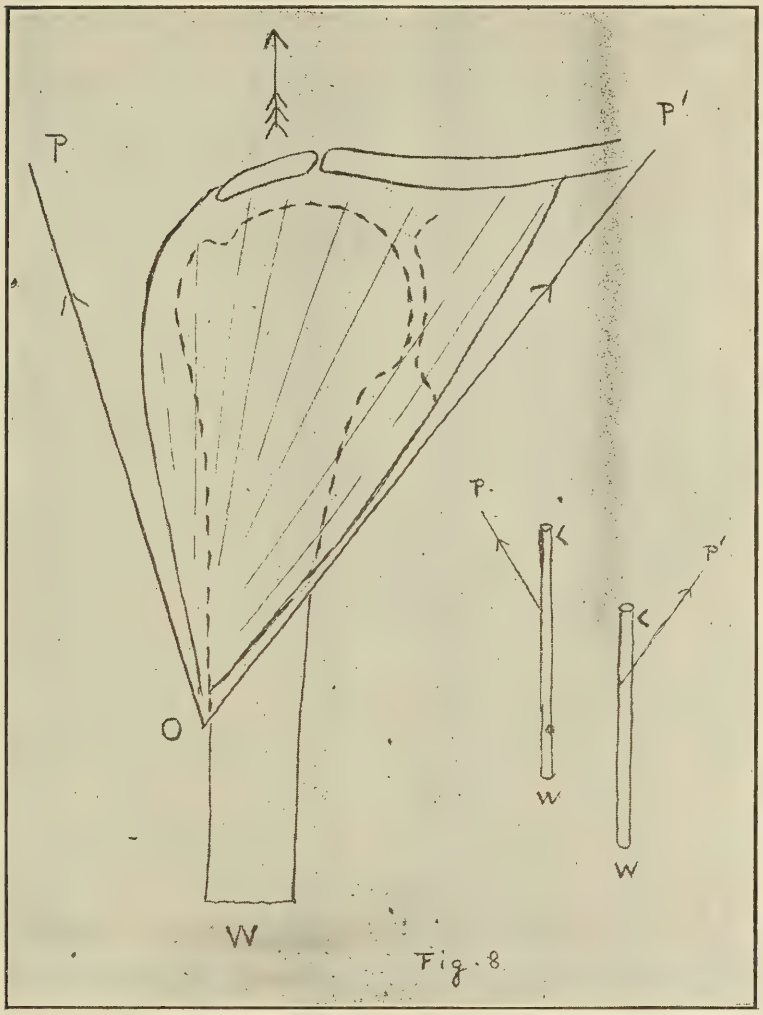


Showing how power is applied by supraspinatus.

When, however, both muscles act simultaneously, the power applied by the supraspinatus furnishes a fulcrum for the power of the deltoid. (See Fig. 1). As the lines of force of the two muscles approach one another (Fig. 2) the

deltoid is able to obtain a fulcrum on the glenoid. In normal action the glenoid bears all the weight and the power of the supraspinatus keeps the tuberosity from seeking a fulcrum on the acromion and coraco-acromial ligament. The function of the bursa is to avoid friction at this point.

Fig. 8.



Showing how power is applied by deltoid.

Soreness in the bursa or of the tendinous insertion of the supraspinatus, throws the latter out of action and the deltoid alone cannot perform abduction. Duchenne has reported a case of circumflex paralysis where the supraspinatus alone was strong enough to perform abduction.

The combined action of the two muscles is so habitual that one cannot voluntarily disassociate them in abduction although one frequently uses the power of the deltoid alone to raise or square the shoulder, and *vice versa* in lowering the shoulder to the position of round or sloping shoulder, one abducts the scapula on the humerus by using the supraspinatus. Even in the latter motion one cannot disassociate contraction of the deltoid.

In my former paper I spoke of the bicipital groove and the sheath of the tendon of the biceps as being entirely separated from the base of the bursa by the expansion of the supraspinatus. I am inclined to think that lesions of the serous sheath about the biceps tendon are rare, but it is possible that in some cases I have confused them with subdeltoid bursitis. One is apt to think that the biceps tendon moves through this sheath when the biceps is contracted or expanded as in flexing and extending the elbow. A moment's consideration shows that this is not so. The tendon might be absolutely fixed to its sheath and yet allow these motions. The sheath is really functional in motions of the humerus on the scapula whether the biceps is contracted or not. For instance, a motion of the humerus backward and forward on the scapula in the frontal plane causes this tendon to pass through the sheath whether the biceps is active or not. This gives a diagnostic point. In cases of subacromial bursitis a considerable backward and forward action is allowed without calling in play the service of the bursa.

Another anatomical fact of great importance is this: that the ligamentous capsule of the shoulder joint is a very insignificant structure and that the real capsule of the joint is a muscular one formed by the subscapularis, the supra- and infra-spinatus and the teres minor. These muscles have tendinous expansions at their insertions, but the muscular bellies completely surround the joint.

Before turning from the anatomy of this subject, I want

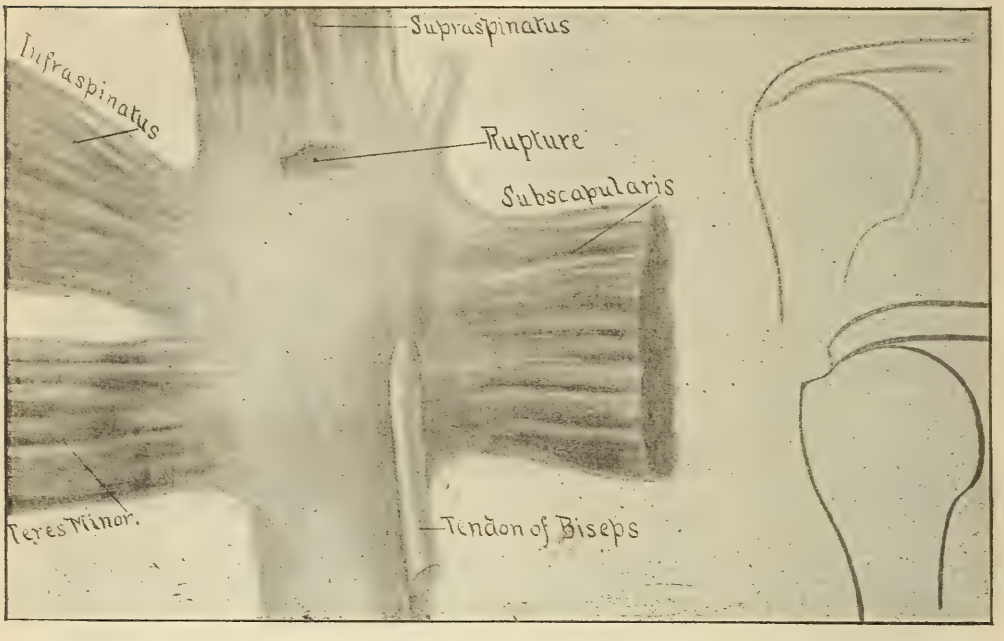
to express my most sincere thanks to Prof. Dwight of the Harvard Medical School for his kind assistance in allowing me the use of material in the Anatomical Department and for his advice and suggestions. I am happy to say that in Piersol's recent anatomy, to which Prof. Dwight has largely contributed, is to be found the only good description of the sub-acromial bursa which I know of in any anatomical work.

PATHOLOGY.

I have little that is important to add about the pathology of this condition. My further experience has merely reinforced the experience reported in my previous paper. The only point worth speaking of is this—that the spot on the greater tuberosity where the tendon of the supraspinatus is usually found damaged, is that point which acts as a fulcrum on the acromion when the supraspinatus is not doing its work. I am more convinced than ever that partial ruptures at the insertion of this tendon may occur from muscular violence alone, during the period of abduction when the burden of overcoming inertia is suddenly thrown on the supraspinatus. Unless this muscle is on the qui vive the powerful contraction of the deltoid tends to force the tuberosity to gain a fulcrum on the acromion and this jams the tendinous expansion of the supraspinatus between the two bones. Anyone who will take the pains to examine a series of dissecting room specimens may convince himself of this by the frequent occurrence of a frayed condition at the insertion of the supraspinatus. It is surprising how large a proportion of subjects show evidence of chronic or healed lesions at this point. There will be many instances in a hundred adult subjects of the condition shown in Figure 9. It is also at this point where the osteophytes of a chronic hypertrophic arthritis cause trouble and gradually work through the base of the bursa, giving the appearance of a normal opening into the true joint or presenting denuded

bone on the base of the bursa. Painter and Baer have also reported cases of a deposit of lime salts in the bursa, which is visible in x-ray pictures. I have also seen these cases and believe that the deposits are not in the bursa but beneath its base in the substance of the tendon. I think they

FIG. 9.



This diagram is intended to illustrate the condition found when the tendon of the supraspinatus is torn. The head of the humerus is seen from the outer side with the tendons and portions of the muscular bellies of the short rotators still attached to it. There is a small tear in the tendon of the supraspinatus near its insertion on the greater tuberosity. The rupture is not complete because the Y-shaped expansion of the tendon still holds it in fair position. As explained in the text, this lesion is at the point where the shoulder is most prominent.

In the outline drawings is shown the smooth contour made by the tuberosity and the overlying tendon in normal condition with the irregular contour found when the tendon has been ruptured. Sometimes instead of rupture of the tendon taking place, the portion of the tuberosity to which it is inserted is torn off.

are due primarily to chronic inflammatory tissue, which having little blood supply undergoes necrosis. The lime salts are then deposited in the necrotic area. Dr. Wright, who has examined a specimen for me, compares the process to one taking place on the heart valves (see Case 26).

SYMPTOMS.

In discussing the symptoms of subdeltoid or subacromial bursitis I will speak of the condition as though it were a definite lesion. This is perhaps not an accurate way of treating the subject, because the causes which bring about the lesions of the bursa are varied and more or less modify the symptoms; but whatever the causes, the following three types of inflammation of the sub-acromial bursa may be more or less clearly defined. They are directly comparable to conditions in other serous membranes. We may speak, for instance, of peritonitis, and describe an acute and an adherent and a chronic type, whether the causes are trauma or chemical and bacterial irritants. Lesions of the subacromial bursa, for purposes of diagnosis and treatment, may be classified as follows:

I. Acute or spasmodic type.
II. Subacute or adherent type.
III. Chronic or non-adherent type.

Symptoms of type I, the Acute or Spasmodic Form.

1. Localized tenderness on the point of the shoulder, just below the acromion process and to the outer side of the bicipital groove.

2. In a small portion of the cases (those in which no adhesion has as yet taken place and in which the spasm can be overcome), this tender point being on the base of the bursa will disappear beneath the acromion when the arm is abducted. When it occurs this sign is almost pathognomonic. (Dawbarn.)

3. When attempts at abduction or external rotation are made, the scapula after a certain point is locked by spasm and moves with the humerus. (Fig. 10). About ten degrees of motion can always be obtained without moving the scapula. In mild cases the spasm may be momentary and occur only just as the tender point disappears beneath

the acromion or just as it reappears from beneath it in the descent of the abducted arm.

4. In certain mild early cases in which there is but little spasm the patient alleges that he cannot, unaided, raise the arm to an abducted position but will allow passive motion. Oftentimes this is not a real inability to abduct and the patient merely means that he cannot raise the arm *without pain*. When the condition is explained to him he generally can abduct the arm. This pain is probably caused by the unwillingness of the supraspinatus to start the pull on its sensitive tendon.

5. Pain is felt either in the region of the point of the shoulder or down the outer side of the arm, even extending into the hand. The patient frequently thinks the trouble is at the insertion of the deltoid; sometimes pain at this point is the only symptom. Pain and discomfort are particularly annoying at night and the patient cannot sleep on the side of the lesion.

6. Occasionally effusion in the bursa is demonstrable and frequently there is puffiness to the touch.

Symptoms of type II, the Subacute or Adherent Form.

In this type actual adhesion exists between the roof and floor of the bursa and there is an absolute mechanical limitation to abduction and external rotation. There may or may not be active inflammation as well.

1. In this type localized tenderness may or may not be present, according to the degree of existing inflammation. In recent cases it is usually present; in old quiescent cases absent.

2. The Dawbarn sign is absent, for the tuberosity cannot be made to pass under the acromion.

3. Abduction and external rotation of the humerus on the scapula are limited to a greater or less extent, usually so much that the tuberosity will not pass beneath the acro-

mion. The ten degrees of free motion in which the function of the bursa is not called into play persists. If it does not the true joint is involved.

4. Beyond an arc of about ten degrees the scapula accompanies the humerus in all its motions whether active or passive. This is best tested by holding the lower angle of

FIG. 10.

Showing the characteristic attitude of a patient with subacromial adhesions or scapulo-humeral spasm when endeavoring to abduct both arms. Abduction on the affected side is mainly accomplished by rotation of the scapula on the chest wall. The angle between the axis of the humerus and the spine of the scapula is practically the same as if the arm were at the side. Notice that on the normal side the axis of the humerus is parallel with the spine of the scapula, while on the affected side it is at right angles to it. On both shoulders the scapula is abducted to its full extent.

the scapula between the surgeon's left thumb and forefinger while the arm is rotated or abducted with the right hand. (See Fig. 10.)

5. The pain is in the same distribution as in type one, and frequently in the neck also and in the severe cases it

closely resembles brachial neuritis. In some cases it is so severe as to prevent restful sleep, and the general condition of the patient may be severely affected. In others there may be no pain whatever.

6. In severe cases there is sometimes inability to completely extend the elbow.

Symptoms of type III, the Chronic Form.

In this type the essential characteristic is painful motion, but the full arc of motion persists. The trouble is due to slight irregularities in the contour of the base of the bursa, usually at the external side of the bicipital groove, so that the motion instead of being smooth and free is interrupted in its course as the irregular point passes beneath the acromion.

1. Localized tenderness may or may not be present; it is often absent.

2. If localized tenderness is present the Dawbarn sign is present, because the tender point can pass beneath the acromion.

3. Abduction and external rotation are but little, if any, limited, but at some point during abduction acute tenderness is experienced which disappears as soon as the tuberosity is safely beneath the acromion. In lowering the arm this sensation is again experienced. The patient usually winces, but the pain cannot be called severe. Instead of a smooth even motion there is a sudden change from an obtuse to an acute angle between the scapula and humerus. Sometimes it is very difficult to demonstrate this pain even when the patient tries to produce it, for it often is elusive, sometimes appearing when the arm is raised but more often when it is lowered. Usually it is produced by abducting the arm in internal rotation rather than in external rotation. The patient sometimes learns to rotate the arm externally before abducting it when he wishes to raise it. Elevation in the frontal plane is usually easier than in the sagittal plane.

4. The scapula does not accompany the motions of the humerus, but, as said above, the relative motions may be jerky and uneven.

5. There may be considerable pain, especially after use; it is sometimes severe enough to interfere seriously with sleep. The pain is often felt at the insertion of the deltoid or in the neck, as in the other types. Occasionally there is pain only complained of, and the disturbance in motion is overlooked.

In my former paper I described a fourth type—severe traumatic cases. I think this was perhaps a mistake and only leads to confusion, for such cases could probably all be included in the other three types. This class was intended especially to include cases caused by rupture of the supraspinatus tendon or separation of its facets of insertion.

Further experience has convinced me that this is a common cause of subacromial bursitis. The rupture is rarely complete owing to the broad expansion of the tendon over the tuberosity. The serous base of the bursa over it may not even be torn, although so close to it as to be involved in the process of repair and to have its contour modified by the loss of substance. Once the contour is modified, friction may occur when the acromion becomes a fulcrum. I believe that such rupture of the tendon may be due to muscular violence alone as in fractures of the patella, or to direct violence on the point of the shoulder. Extreme degrees of this where the infraspinatus is also involved lead, I believe, to recurrent dislocation of the shoulder, because these muscles are needed to prevent the subscapularis from pulling the head of the humerus out of place.

DIAGNOSIS.

In my former paper I did not take up the detailed differential diagnosis from other lesions in this region. I will take them up briefly now.

Tuberculosis.

The early stages of tuberculosis of the head of the humerus are very difficult to differentiate, for its characteristic method of invasion is around the anatomical neck of the bone so that the insertions of the short rotators are involved and fixation produced similar to that of inflammation of the bursa. In fact, I believe the bursa itself is early involved. In three cases of tuberculosis of the head of the humerus, which I have excised, the bursa was involved. Fortunately the x-ray appearance in tuberculous invasion is characteristic and in subdeltoid bursitis is normal, except where there is a deposit of lime. Besides this crucial test, the atrophy of the muscles and the fixation are more pronounced, the 10° which always are free in subdeltoid bursitis being sometimes, though not always, lost in tuberculosis. Fluctuation may sometimes be obtained below the acromion behind or over the bicipital goove. Tuberculin may be used.

The following case illustrates the difficulty in diagnosis:

H. G. Age 22. Greek. Came to Massachusetts General Hospital on June 19, 1906, complaining that his left shoulder was stiff but not painful. On May 4, 1906, he had been riding a bicycle and collided with a car. Was unconscious for a time and was taken to the Boston City Hospital. He was kept there a week. No treatment was given the arm, but an x-ray was taken which was negative. The arm was swollen but not painful until the third day. (The above history was obtained from the patient's friends.) Examination:—Rather anæmic, poorly nourished young Greek. Slight thickening over head of left humerus. No local tenderness. Decided atrophy of spinati and deltoid. Motion in abduction and external rotation only one third less than normal and perfectly painless.

As tuberculosis was suspected on account of the unusual degree of atrophy, an x-ray was taken which showed a slight shadow in close relation with the upper part of the greater tuberosity. This I supposed to be due to deposit of new bone in the periosteum which had been displaced

slightly by the injury. This doubtful appearance in the x-ray and the persistence of such a large arc of motion decided me in the diagnosis of subdeltoid bursitis and accordingly on June 22, 1906, ether was given, the adhesions readily broken up and the arm fixed on an abduction splint. Recovery was uneventful, with very little pain, and on August 30 the arc of motion was normal except for very slight limitation of external rotation. By this time he had returned to his work and was working eleven hours a day in a rubber factory.

On September 12, 1906, he returned to the hospital with a well developed secondary syphylitic eruption and complained of pain in the shoulder. Another x-ray showed the characteristic appearance of tuberculous erosion of the anatomical neck of the humerus. Since that date he has disappeared from observation. I have no doubt that the ill-judged manipulation, although temporarily beneficial, was really harmful.

Fractures of the tuberosity and of the anatomical and surgical neck might be confused, but the x-ray here also gives a crucial test. Such fractures nearly always show ecchymosis and swelling down the inner side of the arm, while the first examination in cases of traumatic subdeltoid bursitis is often negative. We must not forget that subdeltoid adhesions are a frequent late complication of such fractures. In some cases they are equivalent to evulsion of the facets of insertion of the supra- and infra-spinatus. Painter has called attention to the fact that in certain cases there is a calcareous deposit in the bursa which may be confused with a fractured tuberosity by its x-ray appearance. In some traumatic cases the periosteum in this region may be lifted and the superficial bone which is then formed appears to be in the bursa in the x-ray. It is really beneath it. (Cf. Cases 25 and 26.)

Deep axillary abscess. At first sight it seems hardly possible to confuse this condition with subacromial inflammation, but I have several times known the mistake to be made. When such abscesses are small and high under the

pectoralis major their most marked symptom is fixation of the shoulder joint. Careful examination will show, however, that the point of maximum tenderness is under the pectoralis major instead of at the point of the shoulder, and an examination high in the axilla reveals induration.

Muscular rheumatism is one of the common diagnoses which are given to this condition, but one which need hardly be considered when a real effort at detailed diagnosis is made. The term Muscular Rheumatism is commonly used to describe any vague pain in a muscle or a group of muscles. It is even more general than the term "Inflammation of the Bowels" used to be, and should, like the latter, pass out of use. True muscular rheumatism in my experience is now a rare disease, because group after group of more clearly defined clinical entities have been taken away from it. Just as we have learned that most cases of lumbago are due to pelvic disease, hypertrophic arthritis of the spine or loose sacro-iliac synchondroses, so we now find that muscular rheumatism of the deltoid is due to pressure neuritis of the brachial plexus, subacromial bursitis, etc. When other lesions are differentiated there are few which may be called muscular rheumatism, and these have none of the subdeltoid symptoms except pain. I doubt if localized muscular rheumatism is ever persistent. "Muscular rheumatism" is a very convenient term to give to a pain of the cause of which we are uncertain, but when I use it, I confess to an admission of ignorance.

Chronic Rheumatic Conditions.

Goldthwait's classification of what used to be called Chronic Rheumatism into three general divisions, atrophic, hypertrophic, and infectious arthritis, seems to me a long step in the right direction. The more I see of shoulders and other joints the more readily do they fall into one or the other of these three divisions, although, of course, borderline cases occur which appear to be mixtures of these types.

These chronic rheumatic conditions may cause disturbance of the bursa and its functional consequences as well as other forms of inflammation. As I have mentioned above, it is a mistake to think that subacromial bursitis is a distinct disease. The object of my former paper and of this paper has been to call attention to the anatomical importance of the subacromial bursa rather than to call attention to any new disease. I think, however, that owing to the simple anatomical structure of the true shoulder joint these forms of disease are less likely to attack it than other joints in the body such as the knee where the articulation is much more complex. The first two of these three forms of "rheumatic" disease are particularly prone to affect the cartilage and the joint structures at the edge of the cartilage. Owing to the anatomical simplicity of the shoulder joint malformation at the edge of the cartilage would cause less mechanical interference than in any other joint, for the ligaments are of small importance and the joint is really made up of the short rotators which hang the humerus from the scapula. For these reasons hypertrophic arthritis is relatively rare in the shoulder joint, but does undoubtedly account for a certain number of the cases with pronounced subacromial symptoms. (Case 23.) Of the three forms, the atrophic type is the less likely to be confused with subacromial bursitis, because this disease is more truly a disease of the joint cartilage itself, and in the only case I have had the opportunity to study carefully, the symptoms characteristic of inflammation of the true joint were most pronounced. These symptoms are: localized tenderness (more pronounced high in the axilla than under the acromion); more complete loss of motion; a more obtuse angle between the scapula and the shaft of the humerus, when fixation occurs.

In the following case I confused the diagnosis at first, but the failure of treatment, directed toward subacromial adhesions, drew my attention to my mistake. The following

is a brief report of the case. It is quite possible that this may have been a case of infectious arthritis rather than true atrophic arthritis, cases of which usually show more typical involvement of the smaller joints.

Adherent case in obese anæmic woman. Both shoulders involved. Mistake in diagnosis, the true joint being involved instead of the bursa. Duration six months when first seen.

Treatment. One shoulder—manipulation under ether and fixation in abduction. No treatment to the other shoulder.

Result. No improvement from operation. Local treatment abandoned and patient sent to country for constitutional treatment.

Recovery after one year. Untreated arm recovered before the one which was manipulated.

Mrs. M. H. 48 years. Married. Massachusetts General Hospital.

Previous history negative until January 1906, when she began to notice limitations of the motions of the shoulder joints. There was also some loss of motion in the knee joints. She became much run down, pale and sallow, and felt weak. There was not much pain in the shoulder joints except when she made attempts to use the arms. She could attribute the onset of the stiffness to no cause. She had not had grippe or any other infectious disease, nor had she been rheumatic in the past.

In the latter part of March 1906, she began treatment with the Zander apparatus under the direction of Dr. Böehm. On May 24th, as there had been no material improvement, Dr. Böehm gave primary ether and broke up the adhesions in the shoulder joint, but stiffness immediately returned, and although the Zander treatments were continued up to the 12th of June there was no further improvement. At this time she came under my charge, having had in all thirty-seven treatments with the Zander apparatus.

Examination.

Very stout pale looking woman with flabby condition of the skin, suggesting some loss of weight, although patient looks exhausted from having lost much sleep. She is not of a nervous disposition and is courageons rather than other-

wise. Both shoulders show marked atrophy of the spinati. There is little tenderness about the shoulders and no pain except when the arms are moved. When there is pain it is not definitely localized, but in the whole shoulder. The right shoulder is practically ankylosed, for there is no demonstrable motion although there is enough "give" to make it certain that there is no bony ankylosis. In the left shoulder there is about ten degrees of motion. *Both shoulders stand at an obtuse angle with* the scapula, *i. e.*, 120 degrees between the spine of the scapula and the axis of the humerus. It is impossible to demonstrate rotation on either side. There is great pain if forcible efforts to rotate or abduct the humerus are attempted. Owing to the inability of the patient to use the arm, she is practically incapacitated. She cannot dress herself or even feed herself properly. She has lost sleep at night because she cannot obtain a comfortable position. The x-ray shows acute bone atrophy of the head of the humerus. The bony surfaces in the shoulder joint are abnormally close together, showing a loss of articular cartilage.

On July 1st, under ether, I broke up the adhesions in the right arm. Even under ether the right arm was practically ankylosed to the scapula, the usual ten degrees of free motion being absent. The left arm was not manipulated because of the great incapacity that would be caused by temporarily increasing the soreness of both shoulders. No incision was made. After the operation the right arm was kept on an abduction splint for several days. The result was at first encouraging, but there was more than usual difficulty with the splint as the stoutness of the patient made it most difficult to apply it.

She was discharged from the hospital on the 7th of July. The arc of motion was considerably increased, but showed a tendency during the next two weeks to relapse in spite of using the splint for an hour daily. On July 18th I desisted from using the splint because there was so much pain and because the left arm seemed to gain faster than the one which had received treatment. The patient's general condition was so poor that I felt it would be wiser to abandon direct treatment to the shoulder and do what I could by general hygienic measures. She was given a tonic and went to stay with friends in the country and returned

occasionally for observation. Improvement was manifest after a month, both in her general condition and in her shoulders, as far as pain and tenderness were concerned. The left arm, which had not been operated on, gained faster than the right, which on August 25th was noted as still ankylosed.

During the following winter I lost sight of the patient, but examined her again on March 6th, 1908. She informed me that her general condition improved gradually during the summer of 1906, although the shoulders remained stiff. She returned from the country about the 15th of September. Slow improvement in the shoulders continued during the fall and winter. Pain at night continued until January, 1907. She could not dress herself, clasp her hands over her head or behind her back, until March, 1907, and did not regain what she considered satisfactory motion of her arms until the following summer, *i. e.*, a year and a half from the date of onset and one year from the date of her operation.

At the present time, March 6th, 1908, she is a ruddy, healthy looking woman, and has what she considers normal use of her arms except that occasionally there is slight pain in the right shoulder after unusual use. Examination shows that she can elevate both arms to practically their full extent, *i. e.*, 175 degrees. With the arm at the side (*i. e.*, in adduction), complete external rotation is not possible, but when the arm is abducted full external rotation is possible.

This case was an improper one for manipulation under ether or for the Zander motions. The limitation was due to spasm from acute atrophy of the true joint. General hygienic treatment was far more efficacious than local treatment. The ankylosis at an obtuse angle and the lack of a few degrees of free motion should have ruled out subacromial bursitis.

The hypertrophic type may be a cause of subacromial bursitis, because exostoses either on the tuberosity or on the acromion may lead to mechanical irritation of the bursa. I have seen a number of cases of this kind and operated on

one case which showed when the bursa was opened that an exostosis actually bare of periosteum lay in the base of the bursa. (Case 23.)

What Goldthwait has called infectious arthritis, meaning a joint irritation (due either to the presence of organisms or their toxic products absorbed from other regions of the body as the tonsils, gastro-intestinal tract, etc.), and not severe enough to cause suppuration, is a common cause of subacromial bursitis. I believe that such infectious conditions more commonly affect the bursa than they do the true joint, for the reasons alluded to in my former paper, *i. e.*, that the bursa is less well protected and less well constructed to meet ordinary mechanical strains, and for this reason it would be more easily attacked by local irritants.

Acromio-clavicular arthritis. A number of cases have come to my notice where this condition has produced symptoms somewhat similar to those of subacromial bursitis of the third type. A careful examination reveals the fact that there is localized tenderness at the acromio-clavicular articulation; or if the case is traumatic, possibly a subluxation. There is usually a decided thickening about the articulation of the acromion with the clavicle.

Circumflex Paralysis. Before we came to make careful diagnoses of pathologic conditions of the shoulder, many cases were classed as circumflex paralysis. I think that many such diagnoses were made because the patient could not, or alleged that he could not, abduct the arm. In seeing quite a large number of shoulder cases, with careful attention to this point, I have come to the conclusion that pure circumflex paralysis is really quite rare. It may be at once recognized, if present, by the absence of the contraction of the fibres of the deltoid when the effort to raise the arm is made. The deltoid in many of the shoulder cases which we have been discussing is much atrophied,

but when the patient makes an honest effort to raise the arm, even though he does not succeed in raising it, the deltoid may be felt to contract under the palpating fingers. As I have said before, many cases that have been supposed to be due to paralysis of the deltoid, I am quite certain are due to a loss of function of the supraspinatus, without the aid of which the deltoid has little power.

Inflammation of the sheath of the biceps tendon. In my former paper I spoke of the fact that the biceps tendon is remarkably well protected from trauma. It lies beneath the base of the subdeltoid bursa and beneath the tendinous expansion of the supraspinatus. Direct trauma must first injure these structures. The muscular belly of the biceps forms an elastic protection against indirect trauma. I believe that it would take a very violent trauma to dislodge the biceps tendon in the slightest from the groove. Such a lesion would involve the complete rupture of the muscular capsule of the joint. Occasionally, as Monks has shown, the tendon may be torn from its attachment to the scapula, but the symptom produced by this is a change in the shape of the biceps muscle when contracted and not an inflammatory condition of the shoulder joint. Possibly inflammation of the sheath of this tendon may produce symptoms closely similating those of inflammation of the subdeltoid bursa. I confess that I do not feel absolutely satisfied that some of the sub-acute cases are not due to this condition. Very likely in such conditions as the "glass arm" in base ball players, the inflammation of this serous sheath has some importance as well as that of the bursa. As I have said under the head of Anatomy, the sheath of the biceps tendon is functional in motions of the humerus on the scapula, rather than in the motion of the biceps muscle. *Therefore all motions of the humerus, whether abduction or external rotation, involve the motion of the tendon in its sheath.* We can readily imagine that many of the

same symptoms might be produced by inflammation of this sheath as by inflammation of the subacromial bursa. The localized tenderness is sometimes very close to the long head of the biceps, so that it is difficult to say whether it is actually in the groove or on the tuberosity. It is the accurate localization which would influence me in the differentiating. Then, too, simple forward and backward motions on the scapula calls vigorously into play the biceps sheath, while the subacromial bursa is less prominent in this function. In most cases of subacromial bursitis this forward and back motion is the most free of any. Since these two serous spaces are only separated by the expansion of the supraspinatus tendon, it is highly probable that on some occasions inflammation may involve both. They do not communicate directly, but their lymphatic connection must always be very intimate. The presence of ten degrees of painless motion is much against the presence of inflammation of the biceps tendon sheath.

Brachial neuritis. Of all the conditions which are difficult to differentiate, brachial neuritis is, perhaps, the most difficult. It is my opinion that most cases are due primarily to a lesion of the bursa. In the acute cases and the adherent cases without pain, there is no difficulty, but in the adherent cases where there is still active inflammation and extreme pain, the diagnosis is very difficult. I am not sure but that the fairest way is to say that subdeltoid bursitis is the most common cause of brachial neuritis. There are, however, a number of points which indicate that this is at least not a typical brachial neuritis. In the first place, the pain is not felt definitely on the known anatomical courses of the branches of the brachial plexus. There is seldom any considerable degree of tenderness on the nerve trunks; and on the other hand, the diffuse tenderness is usually on the bands of inter-muscular fascia rather than the nerve trunks. In chronic cases, where the motions

of the bursa are very painful at certain points, those points correspond with the degree of motion at which the tuberosity comes closest to the acromion, that is, when an angle of 130 degrees between the shaft of the humerus and the spine of the scapula is reached. Then, too, treatment in these cases when directed to the bursa has produced very gratifying results. Possibly the same treatment which relaxes the structures of the shoulder joint also relaxes the brachial plexus, and in this way improvement might be brought about. Personally, I am inclined to think that the analogy of a cinder in the eye offers a better explanation of the sequence of symptoms. We all know that a small cinder in the cornea prevents smooth action of the lid over the eyeball. Every time there is motion of either, there is irritation. We know there exists a reflex whereby this irritant causes the desire to shut the eye. There is also a reflex leading to increased blood supply and hyperæmia of the conjunctiva. The secretions of the lachrymal glands are increased, and there is an exudate of fibrin which glues the lids and eventually there are intense pain and swelling all over the affected side of the face and head, and the whole plexus of the adjacent nerves becomes tender and inflamed. An irritation of the surfaces of the subdeltoid bursa is similar in its effects to a cinder in the eye and starts a train of reflexes which fix the joint and cause pain through the whole arm.

If one considers the remarkably beautiful sequence of muscular action by which the arm is elevated to its full extent, it is easy to see that a painful irregularity of the surface of the base of the bursa may interrupt the whole chain of reflexes. One must bear in mind too the existence of the nerves of position-sense, which tell us in what position our arm is in at any given moment, and make possible for us the finer motions of the arm such as those involved in painting, piano playing or sewing. The subacromial bursa must be well supplied with these nerves, and nothing

is more natural than that when it is inflamed pain should be felt in the sensory distribution so intimately associated with them in their normal function. Such inflammation too immediately produces a reflex inhibition of the use of the bursa, for the normal sequence of muscular action is replaced by scapulo-humeral spasm which protects the bursa.

If one grants the proposition that the activity of the supraspinatus is essential in normal movement of the shoulder, it is not difficult to see that a rupture from trauma, synovitis from over use, the irritation of an osteophyte or a bacterial infection of its tendon of insertion, changes at once the normal sequence of motion and produces instead scapulo-humeral spasm. I wish to impress upon the reader that interference with this tendon of insertion involves the base of the bursa and *vice versa*, so that disturbance of one is apt to produce disturbance of the other. There is therefore on the point of the shoulder an area not much larger than the finger tip, which is so intimately associated with the nerves of the position-sense and the adjacent motor and sensory nerves that lesions affecting it change the normal adjustments of the shoulder motions to scapulo-humeral spasm and pain in associated sensory nerve paths.

PROGNOSIS.

Before considering treatment it is well to consider prognosis. In some diseases it is almost as well to know the prognosis as to know the appropriate treatment. This is particularly true in the lesions of the subacromial bursa. Many cases consult a physician because they are anxious to know what their trouble is, and having had the condition explained to them and having been told that in course of time improvement is almost sure to come without treatment, prefer to wait for relief rather than to seek it.

In such cases the fear that some unknown trouble is beginning has certainly much to do with the suffering experienced. Improvement frequently begins from the date that the diagnosis is made, especially as it is a fact that these symptoms are more noticed in high strung, nervous, apprehensive individuals.

The prognosis in Type I, the acute cases, is very favorable if the course of the lesion is not interfered with by misdirected treatment. In my experience these cases seldom continue more than a few weeks if a judicious course between too vigorous exercise and too prolonged fixation is followed. Prolonged fixation, either voluntary by the patient in order to avoid pain, or involuntary by apparatus designed by the physician to give support and rest, is the usual cause of delayed recovery. Of course, in cases where the cause is particularly acute, such as those complicating fractures or gonococcus infections, the spasm itself maintains fixation so long that adhesions and atrophy of the short rotators follow.

The prognosis in Type II, the adherent cases, is the most serious, but it is fairly safe to say that even without treatment the disability seldom lasts over two years. Most cases that I have seen have come under observation between six months and one year from the date of onset. I have never yet seen one where the patient complained of disability after three years, but in a few instances, in making examinations for other lesions, I have noticed shoulders which showed restricted motion and some muscular atrophy due to a previous lesion which probably was of this nature.

From my experience I believe that even severe adherent cases (provided no secondary contractures have occurred in the muscles of the forearm) will recover of their own accord without treatment in from one to two years, and in favorable cases in from six months to a year.

The prognosis of cases of infective or insidious origin is is not so good as in traumatic cases.

The prognosis in Type III, chronic cases, in which the mobility is not affected except at certain angles in the arc of motion, is on the whole good. The symptoms may abate or disappear at intervals and return again after several months. Some cases have the same elusive quality that is exhibited by cases of fringes in the knee joint. At times there is no trouble, and again a synovitis of subacute character starts up and the symptoms reappear. Occasionally such exacerbations lead to an acute condition and result in adhesions so that the condition passes through all three types. (Case 16.) Cases of Type III occasionally last for many years with intervals of quiescence.

As I have said above it is perhaps better not to consider Type IV, the severe traumatic cases, as a separate type. These cases according to their severity fall into the other types. If the supraspinatus is barely nicked it will be a case of Type I; if the arm is babied or abused it may become Type II. Or if the immediate symptoms subside without the formation of adhesions there may simply be a notch left on the floor of the bursa where the tear occurred. This notch may spoil the smoothness of motion and cause the symptoms of Type III.

The most severe cases tend to recover as promptly as do other serous sheaths about fractured bones, although where tight dressings have been applied the recovery may be very slow. Their prognosis is the prognosis of the accompanying fracture. The bursa may be badly torn and heal easily, just as it does when incised. Most fractures of the tuberosity and neck of the humerus pass beneath it anatomically.

PART II. TREATMENT.

Treatment of Type I. In treating the acute cases we must consider two main indications — the patient's comfort and the avoidance of adhesions.

For comfort, — we have the usual drugs, *e. g.*, morphine, phenacetine, bromides, asperin, etc., and physiological rest. Rest is best obtained by keeping the arm in an abducted position. As Dr. Monks has suggested, the patient may be seated with a table at his side and the abducted arm laid on a pillow on the table. This position relaxes the short rotaters and deltoid and allows the tender point on the base of the bursa to avoid contact with the tip of the acromion. The physician, in arranging the patient in this position, should not be content with partial comfort but should adjust the pillow until perfect relaxation and comfort is achieved. The patient will soon learn to accomplish this himself.

Dr. C. P. Putnam has suggested to me a position for these patients to assume at night. The arm is supported on a pillow placed with its long axis at right angles with the patient's body as he lies on his back. By this position relaxation in abduction is also obtained. When the patient has to be about, a sling may be used with the utmost caution. He should be instructed to occasionally take his arm out of the sling and let it swing by his side, or when possible to rest it on a table or the arm of his chair. A Velpeau bandage should never be used for more than a day or two.

I regard counterirritants with distrust, especially when applied directly over the bursa. I believe that massage is of considerable value if applied to the adjacent muscles and subcutaneous tissue, but not to the region of the bursa itself.

The following two cases illustrate well this type, when the symptoms are mild and when the treatment does not interfere with recovery. In both cases I believe the primary cause to have been a slight rupture of the fibres of the supraspinatus at the point of the insertion, beneath the base of the bursa. Possibly the sudden action of the del-

toid, without the harmonious and simultaneous action of the supraspinatus, allowed the tuberosity to get a fulcrum on the acromion and thus bruised or abraded the base of the bursa.

Were it necessary I could give many more instances of similar cases, but it seems a useless repetition. In most, as in these cases, the injury is due more to an indirect violence from the sudden exertion of the muscles than from a direct blow on the point of the shoulder. In some cases, however, it appears that a direct blow may bruise the bursa or crush the tendon against the globular head of the bone.

Many cases which at first appear as simple as these may later become more severe types if the treatment is misdirected. For instance, if long fixation is employed adhesions may supervene, or if the patient is obliged by his occupation to over use his arm in abduction, a chronic point of irratation may develop at the point of the lesion and cause friction during motion.

Case 1.—Mr. P. K. Age 19, Electrician. Massachusetts General Hospital, June 26th, 1906.

Four days ago was holding strap in the elevated train. A sudden turn caused a twist in his right shoulder, producing great pain. On the first night after injury he got little sleep. He now complains of pain about the insertion of the deltoid and shoulder, and that he cannot raise the arm.

On examination there is no external sign of injury or of paralysis. All the muscles, including the deltoid, can be felt to contract on voluntary effort, but the patient cannot or will not raise the arm to a vertical position. When the arm is abducted for him he can hold it, however. There is a tender point on the tuberosity which disappears beneath the acromion in abduction.

Under rest, combined with occasional gentle exercises on the Zander apparatus, this patient recovered completely in two weeks.

Case 2. — Mr. A. C. Age 20, Painter. June 4th, 1906. Massachusetts General Hospital.

On June 2d was riding a bicycle and ran into a wagon. Suddenly raised arm to save himself. When seen on June 4th complained that he could not raise arm. Passive motion, however, showed arc of motion normal and, when sufficiently urged, patient could abduct the arm himself, although with pain. During the motion, however, there was a decided jump when the tuberosity disappeared under the acromion. There was acute tenderness at a point on the greater tuberosity just external to the bicipital groove in adduction. In abduction this point disappeared beneath the acromion.

A sling and circular was applied to prevent use of the shoulder, and when in a few days the soreness had abated, gentle exercises on the Zander apparatus were prescribed. In two weeks the patient was discharged well.

It may be asked: "In the traumatic cases, why not suture the small rupture in the tendon of the supraspinatus at once?" If it were possible to diagnose those cases which would become troublesome, such an operation might be considered, but as most cases recover as easily as those just cited, I have not felt justified in attempting suture. In one case where the facets of insertion were torn off as shown by the x-ray, I did suture them, but the suture was ruptured during convalescence. In this case the fracture could be felt through the base of the bursa which was not torn.

Treatment. Type II.—What has been said in regard to the treatment of Type I applies to the more acute cases of Type II, while the adhesions are still more or less plastic. When they have become organized and firm the question becomes quite different. We are then dealing with an actual mechanical impediment to motion, instead of spasm of the neighboring muscles. Of course, frequently we meet both these factors, sometimes one predominating, sometimes the other. Where the spasm is the chief cause of limitation I believe the wisest course is to treat the case

as if it were Type I. When the tenderness and pain have become subacute or quiescent, and stiffness is the chief factor, I think much time and pain may be saved by operation. We are then dealing with adhesions of cicatricial tissue. We have a choice between gradual stretching, rupture under an anæsthetic and division of the cicatricial tissue.

In the severe cases we must advise treatment according to one of these three general plans: —

Group A. Gradual Stretching.

1. Leaving improvement to natural use.
2. Massage, passive and active exercises.
3. Manipulations by physician without anæsthetic.
4. Zander exercises.
5. Baking, electric light, baths, etc.

Group B. Rupture under an anæsthetic.

1. Manipulation under an anæsthetic without incision.
2. Manipulation followed by fixation in abduction.

Group C. Division.

1. Incision into the bursa and direct division of adhesions.
2. Excision of the subdeltoid portion of the bursa.

I can best give my opinion of the comparative value of these forms of treatment after stating what my experience has been with each. The cases which follow are all in what I have called Type II, *i. e.*, the worst kind of adherent cases. No two are exactly alike, because their causes are somewhat different, and the nervous and physical constitutions of the patients vary, but in general we are dealing with the same problem in all cases, *i. e.*, shoulders in which the arc of rotation and abduction of the humerus is

limited by adhesions chiefly in the subacromial, but also in the subcoracoid and other bursæ, as well as by shortening and stiffening of the short rotators.

I shall not give all my cases, because it would only lead to confusion. I have reported only the worst cases and certain ones which seem typical. There have been no bad results except those here given in detail.

For convenience I have separated them in three groups:

A. Gradual stretching.
B. Rupture under an anæsthetic.
C. Division or excision of adhesions.

Group A. Illustrative cases of Type II treated by gradual stretching.

Case 3. *Adherent case with comparatively little pain. Duration six months when first seen. Healthy, muscular, intelligent man.*

Treatment. Condition carefully explained and details of exercises advised and faithfully carried out.

Result. Recovery in five months, i. e., eleven months from onset.

Mr. G. F. R. Aged 45. Real estate agent, referred by Dr. Boucher on June 11th, 1906.

Well developed athletic man in good physical condition. Previous history negative. Six months before he had fallen from his horse. He did not notice much trouble with his right shoulder until the evening, when he noticed lameness and pain. He called Dr. Boucher, who found no ecchymosis, crepitus or other sign of trauma. For a time there was considerable pain, especially at night; but in a few weeks all pain disappeared, and he was troubled only by lameness and stiffness. He had had no treatment.

Examination.—Good general muscular condition, and even the muscles of the affected side were in good condition except the spinati, which showed decided atrophy. Although the shoulder itself showed the characteristic limitations of Type II, the compensatory movement of the scapula had become developed to a high degree, so that the patient could dress himself, etc., fairly well. There was

no pain on motion nor tenderness over the bursa. The case showed well how in an untreated athletic healthy individual the protective spasm had locked the joint to avoid pain, and then allowed organized adhesions to act as a splint. As the patient was an intelligent individual he readily understood my explanation of the condition, and when offered the choice of allowing nature to take her course in stretchiug the adhesions or of having them ruptured or divided under an anæsthetic, he wisely decided on the former. Since he had no pain I did not urge operation strongly. He was given very careful directions for exercises, and shortly after went to the country for the summer. For several months he was constantly in the open air, leading a most healthful life and working a little on his farm, as well as keeping up the exercises. By September the shoulder motion was much better, and by November, 1906, it was perfectly well.

There was at no time any sudden snapping or give in it, but the improvement came about by gradual stretching. I examined the shoulder on March 11th, 1908, and found it normal.

Case 4. *Adherent case with slight pain. Duration six weeks when first seen.*

Treatment. Condition carefully explained and details of exercises advised and faithfully carried out.

Result. Recovery in one year.

Mr. H. J. T. 40 years. Office patient. February 5th, 1905.

Patient is a strong, well-developed man. Tailor. On December 21st, 1904, he stepped off a moving car and fell. He stretched out his right arm to save himself from falling, and does not know exactly how he fell, but thinks that he did not strike on his shoulder. Immediate pain was noticed, but there was no ecchymosis or swelling. He had previously always been healthy, had no rheumatism or other chronic disease. He at first regarded the injury as a slight one and did not consult a doctor, but used camphorated oil, vaseline and liniment to rub on it, etc. There was slight tenderness over the bursa and the characteristic limitations of Type II. Pain was in the usual distribution on the other side of the arm and particularly at the inser-

tion of the deltoid. Atrophy of the spinati was very marked. The shoulder gave him a great deal of trouble in any effort to raise the arm, but he was able to do his work as a tailor. His night's rest was somewhat disturbed, but he slept fairly well.

The condition was explained to him, and he preferred gradual stretching of the adhesions to operation. He was given the following directions to carry out at home, and I prescribed for him a daily routine, allowing a certain number of minutes for each of the following exercises:

1. While sitting at home in the evening he was directed to keep his elbow raised on the arm of a chair or table at his side as much of the time as possible.

2. He was told to mark the day of the month on the wall as high as possible with the lame arm and each succeeding day to write the date above that of the previous day.

3. He was to stand for five minutes each day with his elbow on the mantlepiece and place his feet as far away from the perpendicular as possible, so as to bring the weight of his body on the shoulder.

4. Once a day his wife was to give him massage and kneading of the shoulder muscles.

5. In order to encourage external rotation he was shown how to rotate the arm externally with a cane. The head of the cane is held in the hand, elbow is flexed and the shaft of the cane is allowed to lie over the outer side of the humerus just above the elbow and the tip grasped and pulled by the well hand.

The patient was very conscientious in the use of the above exercises, and progressed slowly and satisfactorily although suffering considerable pain. After about six months of constant use of these exercises he was almost well, *i. e.*, June 6th, 1906, atrophy of the spinati was still present, but motion was practically perfect. He has been seen recently and has had no further trouble.

Case 5. *Adherent case. Duration three months when first seen.*

Treatment. None but ordinary use.

Recovery in one year.

Mr. M. R. Age 56. Gardener. Massachusetts General Hospital. September 14th, 1906. Referred by Dr. McCarthy of Brockton.

Fairly well developed laboring man. Rather stiff in all joints. On June 5th was chopping bean poles when he fell and struck his shoulder or injured it in raising his arm to protect himself. He tried to go on working, but the pain became so bad that he had to stop. Pain kept him awake several nights afterwards, and was so bad that on the day following the injury he went to the Relief Hospital in Brockton for examination.

Examination was made under chloroform, but no sign of fracture was found. (Patient's statement.) The arm was bandaged for eight or ten days, and then he was told to rub it, etc. Pain was very severe for several days and at night for some time.

The condition on September 14th, 1906, was a characteristic case of Type II. There were painless limitation of motion. The patient was advised to have manipulations under ether, but preferred to let well enough alone as long as he had no pain. He was examined again on April 20th, 1908. He then stated that the arm continued to trouble him through the winter of 1906 and 1907, and still gives him slight pain on certain motions. Examination showed that the motions were now perfectly normal. He can raise the left hand as high behind his back as he can the right one. The improvement in motion was so gradual that he was unable to state at just what time his motions became normal.

Discussion of Treatment by Gradual Stretching.

The above three cases are fairly characteristic of the adherent type in favorable individuals; many others might be mentioned. Similar lesions in high-strung or feeble nervous subjects give far greater pain and reduce the patient to a really pitiable condition. Although I have no question that treatment by gradual stretching (as it is done by the skilful masseur and Zander specialist, or by the intelligent physician who understands the importance of not urging the joint too frequently or too violently), has an undoubtedly good effect on these cases, yet my personal experience with cases that have consulted me when the lesion has existed six months or more shows me that there is no great difference

between the treated and untreated cases except in palliation of symptoms, and possibly a few months in the duration of the disability.

The mistake of nagging at the adhesions too much and keeping them in a state of inflammation is quite as frequent as marked alleviation. Such cases as these just detailed, who have passed through the acute stage and come to painless adhesion, suffer less than those which have been interfered with from the first by too conscientious treatment. If these same cases had been obliged to take rest in abduction when they were first injured, and had not been allowed to use their arms when locked with scapulo-humeral spasm, I believe they would have recovered promptly. If on the other hand they had been manipulated during the painful stage they would have suffered more, even if they had not been made really worse.

It is unnecessary to discuss in detail such palliative treatments as electric light baths, baking, vibration, etc. They are all matters of palliation and will be used at the discretion of the attending physician. I have seen no evidence of any curative effect from them, and, as will be seen later, I consider incision the best palliative for pain.

Group B. Illustrative cases of Type II treated by rupture under anæsthetic followed by fixation in abduction.

Case 6. *Adherent case. Strong, healthy carpenter. Duration five weeks when first seen.*

Treatment. Manipulation under ether followed by fixation in abduction and later Zander exercises.

Result. In six weeks well enough to work, although some pain continued for several months.

Mr. E. B. 53 years. Massachusetts General Hospital. March 6th, 1905.

Patient was a well developed, healthy looking carpenter. His past history was negative. Five weeks previously, on January 23d, 1905, he had been running for a train and fell. He did not know exactly how his shoulder was hurt and did not think it was seriously injured at first. He loafed

for three weeks and carried the arm in a sling. He used liniments and adhesive plaster strapping on it.

Examination showed slight swelling and thickening of the region of the subacromial bursa. Marked atrophy of the supra- and infra-spinatus, so that the spine of the scapula was particularly prominent on the injured side. Limitations were typical, *i. e.*, with the elbow at the side, the forearm flexed to a right angle with the humerus; only a few degrees of rotation could be obtained without moving the scapula. Abduction of the humerus on the scapula could not be carried over ten degrees without pain. It was impossible for the patient to get his hand behind his back. (In future histories, for the sake of brevity, these limitations will be alluded to simply as characteristic of Type II.) The shoulder was so stiff and tender that it prevented his working with any comfort and prevented his obtaining proper sleep at night. He could not lie on the side of the injured arm and was frequently waked by the pain. The pain was felt about the insertion of the deltoid and along the outer side of the biceps muscle.

He was admitted to the hospital on March 6th. Under ether I broke up the adhesions and put the arm in an abducted position in plaster. Plaster was kept on for six days and the patient was discharged to continue treatment with the Zander apparatus. Zander treatment was continued until April 29th, when he returned to work and has remained at work since.

He was seen again on June 6th, 1906. He said that the arm was then as good as ever, but that a slight pain had continued in it for several months after he had returned to work, but he had been able to do his regular work as a carpenter all the time. He was very grateful.

Examination showed a barely perceptible atrophy of the spinati and about five or ten degrees of limitation at the extreme limits of external rotation and abduction. This was the first case which was treated in abduction.

Case 7. *Adherent case in sallow, anæmic, poorly nourished man.*

Duration eight months when first seen.

Treatment. Manipulation under ether and fixation in abduction.

Result. Recovery in three months.

Mr. F. H. H. Age 46. Referred by Drs. Putnam and Waterman on June 22d, 1905. Laundry business.

Patient is a sallow, lethargic, tired-looking individual, but fairly well built and well muscled. Neurasthenic temperament. Eighteen years ago he fell in a gymnasium on the base of his spine and was laid up all the next summer. Six years ago he had the grippe, and was very slow in recovering. Since then his "nerves have been shattered." Habits good. No venereal.

About eight months ago he hurt his shoulder in pulling on a lever in a automobile. The injury was not severe, and yet did not get better. At first there was only lameness, but since December there has been much pain. Since then he has been occasionally to Dr. J. J. Putnam, who has treated him by baking and electricity. The arm troubled him a great deal; can hardly dress and undress himself, etc. Pain at night prevents continuous sleep, etc.

Examination shows the characteristic limitations of Type II. Tender spot on tuberosity on outer side of bicipital groove. Decided atrophy of spinati. Systolic murmur. Patient also complains of similar milder pains and tender spots about other joints.

Operation June 24th, 1905, at Eliot Hospital. Ether. Adhesions easily broken up. Abduction splint. Convalescence normal, except that pain at night continues to a certain extent. Splint removed at intervals and frequently adjusted. In twelve days left the hospital with instructions for exercises, etc. At that time could adduct slowly to full extent. External rotation somewhat limited. Pain gradually abated, and in midsummer the patient went on a camping trip and returned practically well. When seen in the fall the motions were normal. He had greatly improved also in general appearance and in his muscular condition. A slight atrophy of the spinati still persisted.

Case 8. *Adherent case in elderly laborer with neuritis and Volkman's paralysis.*

Duration three months when first seen.

Treatment. Manipulation followed by fixation on abduction splint.

Result. Great immediate improvement. Shoulder well in four months, but evidences of Volkman's paralysis still present.

Mr. J. H. M. Aged 68. Massachusetts General Hospital. April 7th, 1906. Well developed elderly Irish laborer.

On January 9th, 1906, he fell forward on his outstretched arm on the sidewalk. He consulted a doctor and was treated in splints for seven weeks, although no fracture was demonstrated. Pain and stiffness during these weeks was great and a definite diagnosis could not be made. The following note was made on his condition in the Nerve Department of the Massachusetts General Hospital. "On March 6th, 1906, hand somewhat swollen, passive motion of shoulder, elbow, wrist and finger joints limited. All motions of the shoulder made, but limited. Triceps weak. Atrophy forearm. Supinator longus preserved. No motion of thumb. Slight flexure of fingers; better ulnar pair. Sensation of touch diminished over ulnar distribution, and radial and median apparently preserved. Reaction of degeneration of muscles supplied by ulnar nerve."

When seen by me on April 7th, the above notes would still have been applicable. There were typical signs and symptoms of a severe case of Type II, as well as Volkman's contracture of the muscles of the forearm. His condition was pitiful. On April 11th, under ether, I manipulated the shoulder and broke down a number of adhesions. After the operation the arm was placed on an abduction splint for a number of days. The convalescence was normal except for the contracture of the fingers, due to the stiffness of the forearm.

On April 23d, with the hope of improving these contractures, I again gave ether and manipulated the wrist and fingers as well as the shoulder again. The patient was soon after discharged from the hospital considerably improved.

On August 3d, 1906, the shoulder was well, but the wrist and hand still showed typical Volkman's contracture although they were distinctly improved as compared to the condition before operation.

When examined on June 12th, 1908, the motions of the shoulder were normal, those of the wrist about one half normal in extent. The contracture of the fingers still exists, although each finger could be moved voluntarily somewhat. There was marked atrophy of the intrinsic muscles

of the hand, but they were not entirely paralyzed. The deformity was characteristic of a Volkman's contracture.

Case 9. *Adherent case in anæmic woman.*
Duration six months when first seen.
Treatment. Manipulation under ether, and fixation in abduction.
Result. Recovery of motion almost immediate, but some pain persisted for seven months.

Mrs. E. B. J. Age 50. Massachusetts General Hospital. June 22d, 1906.

Well nourished anæmic looking woman. Had "erysipelas" of the hand (probably felon) in January, 1906. Arm was carried in a sling for a number of weeks and stiffness of the shoulder was noticed about the first of February. Came to Hospital on May 4th for treatment of stiffening of fingers due to cicatrices. Shoulder was then stiff. Had been attending Zander room up to the time I saw her. The limitations were characteristic of Type II. There was no great complaint of pain, but the incapacity was great. Operation June 26th, 1906. Under ether the adhesions were broken up and the arm put on an abduction splint. On the second day after the operation the arm could be fully abducted.

On July 2d, she returned to her home in Maine with careful directions for exercises. She kept up these exercises until February, 1907. There was some pain at times during the winter, but from the time of the operation she could clasp her hands over her head and behind her neck.

Case 10. *Well developed, well nourished woman. Shoulder secondary to Colles fracture.*
Duration three months when first seen.
Treatment. Manipulation under ether and fixation in abduction.
Result. Recovery in two months.

Mrs. E. H. Age 49. Massachusetts General Hospital. June 26th, 1906.

Well developed, well nourished woman. Occupation—trained nurse. Three months ago fell and broke right arm. (Colles fracture.) Splints were applied by local physician and keep on for three weeks. No injury to the

shoulder was noticed at the time of the accident, but when the splints were removed the shoulder was found to be stiff and painful. The Colles fracture did not do well, and a typical "shiny hand" with stiff useless fingers resulted. The shoulder presented the characteristic symptoms and signs of Type II.

The patient entered the hospital in the service of Dr. Conant, and was operated on (July 18th, 1906) for a bad ventral hernia by Dr. Conant. Toward the end of the hernia operation I manipulated the shoulder, and broke up the adhesions. A posterior splint was bandaged to the forearm and also to the head of the bed, thus holding the humerus in abduction. The stiffened fingers were also gently manipulated.

To my surprise the convalescence was not more painful than is usual after a laparotomy. The abdominal pain and soreness were so much greater than the pain in the shoulder that the latter was scarcely noticed. At the end of the week the patient was allowed to have the arm by her side, but frequently rested it in complete abduction. By the time she was able to sit up (about three weeks) she was able to do her hair, and could use the arm pretty freely although some pain still continued. On August 30th the motions of the shoulder were almost normal, although the fingers and wrist were still very stiff.

On April 1st, 1908, she was again examined. The shoulder was perfectly normal in all the range of its motion, but she stated that occasionally there was a slight momentary twinge of pain in it. The wrist presented the usual limitations of an imperfectly set Colles fracture.

Case 11. *Adherent case in intelligent man with good physique.*

Duration three months when first seen.

Treatment. Manipulation under ether and fixation in abduction, followed by exercises.

Result. Recovery in three months.

Judge J. D. S. Age 61. Referred by Dr. G. C. Smith, on September 6th, 1906.

Bright intelligent man, with good physique for his age. Previous history negative. Not rheumatic. Onset of trouble with shoulder was insidious, three or four months

ago. No known cause. For 2–3 months it has been considerably worse, and for the last 1–2 months has interfered with sleep. There is pain in the day time, too; certain motions and positions caused quite sharp pain. The pain is mostly in the outer side of the upper arm.

Examination showed distinct atrophy of the infra- and supra-spinatus. Tenderness greater in posterior than anterior portion of bursa. Slight atrophy of triceps and deltoid. Limitations characteristic of Type II.

Operation at Elliot Hospital September 7th, 1906. Under nitrous oxide adhesions broken up. Humerus abducted by means of posterior forearm splint attached to head of bed.

My notes state, "Kept in bed three days with the arm abducted. Great discomfort at night, and little sleep. On the whole more comfortable than cases treated on splint. Massage, passive and active motion, every day until September 17th. At this date motion nearly normal in abduction, but both internal and external rotation limited one-half." Passive motion at office under nitrous oxide with still greater improvement. Within a few days after this he left Boston.

This patient was able to learn his post-operative exercises easily, because he could understand my explanations of the importance of keeping up motion to prevent the adhesions from reforming. The following letter from him on March 16th, 1908, gives a very good idea of his convalescence:

"My dear Dr. Codman:—I have your kind letter of the 11th inst., inquiring in regard to my shoulder. I will endeavor to answer your questions, although I cannot be very accurate with respect to dates.

1. Pain at night continued severe enough to interfere with sleep to some extent until Oct. 1st, 1906; operation performed Sept. 7th, 1906.

2. I could dress myself alone, with some discomfort, by Oct. 10th.

3. I could clasp my hands over my head, I think, about the middle of October, and behind my back about November 10th.

4. I think I was symptomatically well by the 1st of December, at which time I could clasp my hands over my head and behind my back without much difficulty, and by Chirst-

mas without pain. The most difficult matter I had to overcome was raising my hand between the shoulders behind.

5. I called myself recovered by the first of the year 1907.

There is this I wish to add to this statement: There are certain positions in which I get my shoulder, when raising my hand and putting it behind my head, or raising it behind my back in certain positions, where I can feel a lameness in the left shoulder, which I do not get in placing my other arm in the same position. I am, however, in the enjoyment of good health, and am glad that I discovered what was the trouble with me and applied the remedy.

I think I am somewhat of a coward with respect to physical pain. I often laugh at the howling I let out on ——— Street, in that private hospital on my first stay there. I never shall forget my creeping out of bed the last of my stop there to examine the record of the night nurse. Her last endorsement one morning was something like this: "Patient claims he has not slept during the night. He slept nearly all the time." With kindest regards, etc."

Case 12. *Adherent case in Irish laborer.*
Duration four months.
Treatment. Manipulation and exercises, with short use of abduction splint.

Case illustrates typical signs of partial rupture of supraspinatus tendon. Mr. D. D. Age 33. Laborer. Massachusetts General Hospital. July 24th, 1906.

Strong well developed laboring man. About four months ago he fell on a railroad track and hurt his left shoulder. Did not notice much pain at the time, but after a couple of days it became severe, and at the end of a week he came to the Massachusetts General Hospital, Orthopedic Department, for relief. The motion was then limited and painful. He was treated with adhesive strapping and Zander exercises until May 17th, when the disability had become so much worse that ether was given by the orthopedic surgeon and the adhesions broken up. Since that time he has had occasional treatments on the Zander apparatus without much improvement.

The signs and symptoms when seen by me on July 24th were characteristic of Type II, except that there was a fair arc of passive motion and but little active abduction. The

poor fellow had been obliged to work right along between his treatments and the compensatory motion of his scapula was well developed so that he constantly used his scapula as part of his humerus.

On August 1st, 1906, under ether, I again manipulated the arm, finding the adhesions few and light. The arm was fixed in abduction for two days, and convalescence was normal with slight pain and good motion. The adhesions did not form again, but for some weeks there was great difficulty in getting active abduction although passive abduction could be easily obtained.

At this time he offered a beautiful demonstration of the lack of function of the supraspinatus. When he attempted abduction his powerful deltoid would draw the head of the bone up under the acromion, and then the well developed thoracic muscles would abduct the scapula on the thorax, but in so doing would abduct the humerus and scapula. If, however, before attempting to abduct the arm, he gave it a little help with the other hand, so that the motion of abduction could be started and the humerus could obtain a fulcrum on the glenoid, the whole arc of motion would occur in a normal manner, except for the jerk as the irregularity of the tuberosity passed under the acromion. By giving the arm a swing he could start the motion and obtain abduction, but with any weight in his hand he could not abduct from the straight position. External rotation was good. At this stage he was lost sight of. He was able to work.

Case 13. *Adherent case in an exhausted old woman. Operation for relief of pain.*

Duration five months when first seen. Constitutional complications.

Treatment. Manipulation under gas and fixation in abduction.

Result. No material improvement in shoulder, because severe constitutional symptoms supervened. Death six weeks after operation, with symptoms suggesting thrombosis due to rupture of axillary vein at operation.

Mrs. C. W. 59 years. Referred by Dr. J. J. Putnam, November 24th, 1906. Anæmic, feeble, flabby old woman, in a desperate condition of nervous exhaustion from pain and lack of sleep. She had been fairly strong until one

year before, when she had lost her daughter after a long and tedious illness. After this she broke down completely, and has been in a very poor condition since. Five months ago she began to have progressive pain and stiffness in the left shoulder. Her local physician had used electricity, vibrators, massage, etc. without relief. She was becoming much debilitated by loss of sleep, pain and despondency. On November 10th, 1906, her local physician broke up the adhesions under ether, and applied an abduction splint. Little relief followed, and the patient's condition became still worse. There was considerable reaction in temperature, and the patient's courage entirely gave out, so that she became unmanageable. The Doctor was obliged to give ether again about November 17th to reapply the splint. No relief followed, so that on November 24th the patient was sent to Boston to be under my care.

Her condition was then pitiable in the extreme. Her eyes were deeply underlined and her appearance the picture of apprehension. The shoulder was exquisitely tender, and the slightest attempt at motion caused the expression of agony. It was difficult to tell whether this was due to actual extreme pain or to the complete loss of control from pain already suffered. She had needed a considerable amount of morphine during the past two weeks.

The limitations of motion were characteristic of Type II, but the exquisite tenderness made the condition also exhibit the characteristic spasm of a severe grade of Type I. Although the spinati, deltoid and triceps were much atrophied, there was decided œdematous swelling of the subcutaneous tissues, particularly about the posterior aspect of the arm and shoulder. There were no signs of fluid in the joint or in the bursa, and the x-ray showed no organic disease of the bone. The forearm was also atrophied and the fingers held in semiflexion. They could barely be moved voluntarily, and the grip was very weak. The flexor muscles of the forearm were tender, and it seemed to me that the condition was practically the acute stage of Volkman's ischemic paralysis. She could not touch her hand to her forehead even by bending her head down, unless she used the right hand to lift the left one; even then it was difficult for her to raise the clasped hands to her forehead. Yet

there was no absolute paralysis of any muscle. A certain extent of voluntary motion could be demonstrated in each.

Evidently her condition precluded interference, and I simply put her to bed without apparatus or local treatment of any kind, except gentle massage of the adjacent parts. Everything possible was done to improve her general condition, and a most careful examination made to exclude any organic disease. Nothing was found except a systolic cardiac murmur.

After ten days rest in the hospital her condition had somewhat improved. The febrile reaction which had followed the manipulation before she came to me had practically disappeared. Pain, however, still continued and it was impossible for her to obtain even a fair night's rest without morphine. She was anxious to have something done, and at length I was persuaded to repeat the manipulations. On December 3d under gas I gently manipulated the arm. No incision was made. The adhesions were light and yielded easily—too easily—I think that I tore the attachment of the tendon of the supraspinatus. As a result in complete abduction the head of the bone could be almost dislocated into the axilla, and in abduction fell away from the acromion. No abduction splint was at first applied, but a posterior splint was bandaged to the forearm and also to the head of the bed, thus abducting the humerus.

The reaction following the operation was marked. The pulse, which previous to the operation ran at 90, rose to and remained at about 120 for four days. It then became irregular, occasionally dropping to 90, and ranging most of the time between 110 and 130. This continued until her discharge from the hospital on December 28th, and probably until the time of her death on January 14th, 1907.

The temperature continued normal for three days after the operation, then rose suddenly to 101 on the afternoon of the third day; from that time on it was variable, ranging from 97.2 to 102.2, sometimes being practically normal for several days together.

After the operation there was much pain and the patient became extremely hysterical, almost maniacal. Morphine was necessary every night. The arm appeared paralyzed, but when the patient was sufficiently coaxed it could be demonstrated that no single muscle was paralyzed. The

shifting œdema in the hand and shoulder became more than ever noticeable and would gather in the most dependent part within an hour or two and would leave as rapidly when the part was elevated. For instance, when she sat up, the hand and forearm would swell; when she lay flat and the hand was elevated the shoulder would swell. At the time I attributed this œdema to the leakage of synovial fluid from the ruptured capsule. There was no sign of thrombosis in the peripheral veins, but the veins of the neck and side of the chest became unduly prominent.

From the time of the operation until her death, she complained of attacks of abdominal pain. These attacks were usually accompanied by a rise in temperature and abdominal distension. They were frequently but not always relieved by enemata and cathartics. There were no localizing abdominal signs as tenderness, muscular spasm, rigidly or palpable masses. At one time there was an attack of jaundice which lasted several days. There was no local indication of disease of the gall bladder. Meantime there was slight improvement in the condition of the arm in response to most careful daily manipulations and applications of the faradic current, etc. I have never taken care of a more difficult case nor worked harder over one. By December 28th I succeeded in getting the patient so that she could go without morphine, could walk about with the arm swinging at the side, and could use the fingers fairly well. Abduction could be performed passively, but not actively, as the supraspinatus was evidently out of commission.

She then returned to her home with careful detailed directions for treatment.

I am told by her physician that in spite of slight improvement in the use of the arm the local œdema continued. The attacks of abdominal pain came on again. At times there was also complaint of (angina-like) pain in the left side. On January 14th, 1907, she had a convulsive attack and suddenly died. No autopsy was obtained.

It seems to me that it is likely that thrombosis of the left subclavian may have been caused by the manipulations. The shifting œdema of the arm, the development of dilated thoracic veins, the sudden rise in temperature on the third day, the irregularity of pulse and temperature without local signs, the vague but severe abdominal pain, the jaundice,

the angina and finally the death in a convulsive seizure, all seem to me to point to this diagnosis. A previously existing endocarditis cannot, however, be ruled out.

During the time she was under my care the physical condition was so masked by her extreme hysterical state, which was almost mania, that I did not suspect either thrombosis or endocarditis. I attributed the symptoms to the extreme pain, loss of sleep, and deep despondency.

Case 14. *Adherent case in thin anæmic old woman with chronic nephritis. Duration six months when first seen.*

Treatment. Manipulation under ether and fixation in abduction.

Result. Did well for two weeks, when symptoms returned worse than ever. Constitutional breakdown so that treatment had to be abandoned. In spite of this, recovery from shoulder symptoms in about a year.

Mrs. E. A. Age 60. Referred by Dr. J. J. Putnam, on December 21st, 1906.

Thin, anæmic, dried-up looking old woman. Has always been rather feeble and has had a variety of nervous troubles as well as "gastric fever" and a number of other periods of illness. About ten years ago had a similar trouble in left arm. Present trouble began in July, 1906. It came on suddenly after an attack of "pleurisy" when she was "run down." She had not been well since April. Stiffness and loss of strength were noticed before pain. Four months ago pain became severe. At this time she had fever, vomiting and chills. For the last two months she had been under Dr. Putnam's care, and a slight improvement had been effected by the use of electricity, baking, and electric light baths. She had recently been much depressed and discouraged, as the pain had prevented regular sleep and in consequence she had become quite debilitated.

Examination showed the characteristic limitations of Type II. There was great atrophy of the spinati and also more or less shrinkage of the arm muscles, especially of the biceps and deltoid. The pain extended from the neck to the wrist. An x-ray showed no disease of the bone.

Besides the trouble with the shoulder she also complained of occasional attacks of dizziness. In two of these attacks

she had fainted; in one she had fallen. The urine showed a low specific gravity, with a few fine granular casts and a trace of albumen. The second pulmonic was accentuated. There was no anasarca.

Operation at the Eliot Hospital, December 28th, 1906. Under nitrous oxide the adhesions were broken up and the arm abducted by tying a forearm splint to the head of the bed. After the operation she did exceptionally well and was sent home on January 8th, 1907. During her stay in the hospital the progress was uneventful, and when the arm was abducted so that the sore point was under the acromion she could move it freely. In this case there was, however, more than usual difficulty in getting the arm down past the critical point, and *vice versa* in getting it up again. There was also much nausea after the operation, and for several days afterward she complained of abdominal pain of much the same character as that in Case 13. At the time she left the hospital, January 8th, she could move the arm comparatively freely, and though some pain still continued and disturbed her night's rest, she was progressing favorably.

After returning home improvement continued for about a week when intense pain began again, and she became unable to continue the exercises as I had directed. Her family physician, Dr. Shaw, was called and found it necessary to give opiates to obtain any relief. The shoulder and whole arm became exquisitely tender; œdema appeared about the elbow and wrist. Great mental depression ensued, the pulse became weak and the clinical picture became one of extreme mental, physical and nervous exhaustion. It was obvious that nothing further could be done to improve the shoulder until her general condition was better. I saw the patient from time to time with Dr. Shaw until February 19th, 1907, and made some futile attempts to devise splints to rest the arm enough to relieve pain. At this date, thanks to Dr. Shaw, the patient had recovered enough strength to move to the home of relations in the country where conditions would be more favorable to the return of her vitality. The shoulder was then a characteristic case of Type II again. Evidently the original cause, whatever it was, had again started up at the time of the exaccerbation on January 14th.

I am indebted to Dr. N. K. Noyes for the following additional notes about the previous history and present condition of this case: —

"Dear Dr. Codman: Your letter of March 31st at hand, and I shall be very glad to give you what information I can. I am also very glad to have had the pleasure of reading your notes on Mrs. A.'s case, when she was under your care, for I have heard a good deal about the operation and her subsequent sickness, but could never get from the patient or her daughter a very distinct idea of just what happened at that time. I have known Mrs. A. for the past ten years, and occasionally during that time she has been under my care. Never for any serious illness till this winter, and usually for only an occasional visit when she would come to my office or call me to her home in Marshfield, when she lived there. Ever since I first saw her, ten or more years ago, she has been the 'thin, anæmic, dried-up looking old woman' you describe. I should have added poorly nourished as well, for that has been my diagnosis always that she was 'starved.'

She has always complained of pain. I have no notes back of 1903, but at that time I put down on the record card among other complaints 'pain in the extremities.' In 1904 I find 'pain in the extremities,' pulse 100, etc. In March, 1905, I find a note made at a call at Marshfield, 'Comp. pain in rt. side of head, of great weakness,' and of looking 'blue.' Has had some palpitation and short 'breath.' About this time wt. 91 lbs. 11 oz. and pulse 124. 1906, May 12th, I find this note: 'Has had fairly good winter. Just lately was ill and called in the local Dr., who said she has 'rheumatism.' Has had a 'sore pain over region of liver, and a good deal of smarting and burning pain over rt. eye and in both shoulders and arms and down back of neck. Wt. 92 lbs. 10 oz. pulse 98 and fairly good character.' All this I appreciate has little interest for you except that it shows that for years she has had pains evidently of nerve origin.

If my notes had gone back 10 years farther they would have read about the same. I do not think I saw the patient from the spring of 1906 till Dec., 1907. She had then been poorly for some time, had had a good deal of trouble

with her stomach, and was barely able to be about the house. At that time she said she had a good deal of 'neuritis pain in her arms and shoulders,' but not more in the right than the left. Under general tonic treatment and forced feeding she improved a good deal. But she had attacks of extreme nervousness, and at times was troubled with insomnia and had a good deal of pain in arms and shoulders. At other times the pain would be in her stomach or bowels, and some times in her face and head. Late in January, 1908, she had several spells of being very nervous and excitable, and would walk constantly up and down the room or, if she went out of doors, across the fields and back. Then about the first of February she suddenly seemed to go all to pieces. All her nervousness disappeared and she preferred to remain in bed and took large quantities of nourishment and slept a good deal. After several weeks of this condition she began to show evidence of mental weakness and could not talk quite straight, mixed her words and names, and even imagined things or at least told of things which were not real. This condition grew steadily worse, and about the middle of March she developed a temperature which at its height reached 103, and for about 48 hours she was entirely unconscious. At this time the right arm was somewhat swollen, and any attempt to move it gave rise to evidences of its being painful. Much to the surprise of her family and friends, and I must confess of myself, she has slowly rallied from this condition and is brighter mentally than she has been for a number of weeks. She uses the right arm almost as well as she does the left and does not complain of excessive pain anywhere, although there is some of the 'neuritis pain,' as she calls it, at times, though never steadily or in any one place.

She is still very weak and is more nervous than at one time, but she is eating better and sitting up for a few minutes at a time; the urine is of a low sp. gr., light in color and there are some casts. Evidently there is an interstitial nephritis.

So far as her arm is concerned I do not see much difference between the right and the left. This patient had had a good deal of mental worry about family affairs for a period covering a good many years. She was one of six

children, five of whom are living. Two are fairly well and of the other two beside this patient one is a cripple with some form of chronic rheumatism, and the other who looks very much like the sister and has the same cadaverous aspect is more or less an invalid with chronic asthma. I do not think this patient has ever been addicted to morphine, nor do I attribute her symptoms due to hysteria. There probably has been a nephritis for some years."

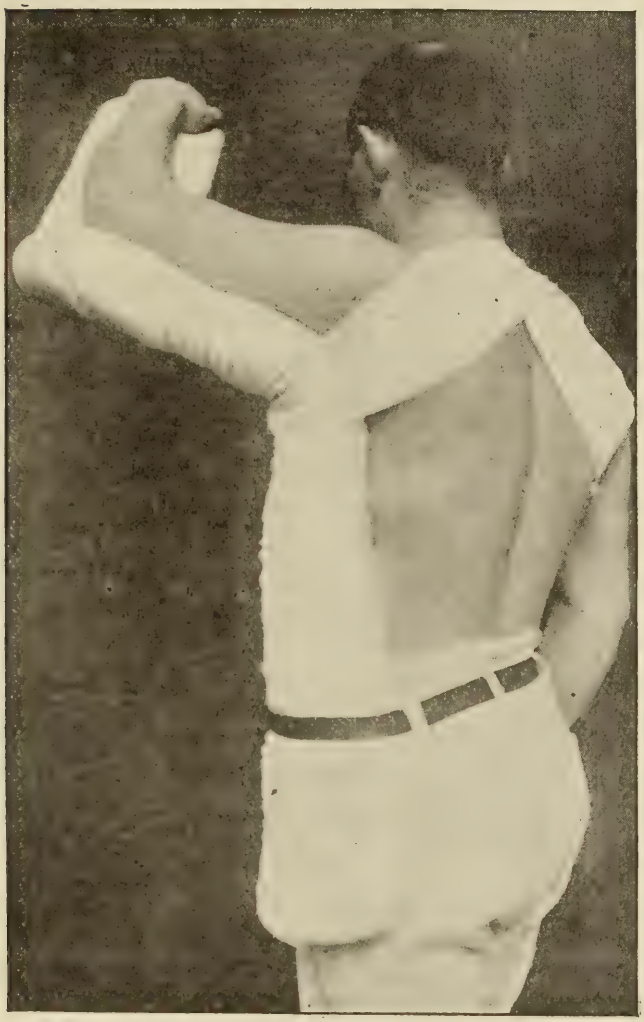
DISCUSSION OF TREATMENT BY RUPTURE OF ADHESIONS UNDER AN ANÆSTHETIC.

Many authors in writing on these cases as Periarthritis have advised rupture of the adhesions under an anæsthetic to hasten recovery. This treatment was introduced in Boston by Dr. J. J. Putnam twenty-five years or more ago, and has been in vogue at the Massachusetts General Hospital and other clinics until recently. In some cases this operation undoubtedly shortens the period of convalescence by many months. There are two main objections to it. As I pointed out in my former paper it may tear the normal joint structures more easily than the dense adhesions in the bursa, and thus rupture the atrophied and stiffened supraspinatus or the other short rotators. I believe that I have had this happen at least once. (Case 13.) The brachial plexus and the axillary vein are also in danger.

The second objection is that in those cases where the adhesions alone are ruptured there is a tendency for them to reform again, since the soreness incident to the manipulations starts scapulo-humeral spasm once more and leaves the raw surfaces in contact.

It was the apparent unreliability of this treatment which originally led me to investigate these cases. In my paper in 1906 I recommended the use of an abduction splint (Fig. 11 and legend) to obviate this difficulty, with the idea that in this position the abraded surfaces would be separated, and apposed to healthy surfaces to which they would be less likely to unite. Cases 7, 8, 9 and others

FIG. 11.



Showing the abduction splint in position, the patient standing. It is held by a figure eight bandage which crosses behind the shoulders and by a belt about the hips. The arm is at rest.

DESCRIPTION OF SPLINT.—The frame of the splint which I use is made of iron wire (diameter one quarter inch), stiff enough to maintain its form and to carry the weight of the arm securely. Sufficient cotton wadding to thoroughly pad it is bandaged over it and the whole covered with cotton or linen cloth. The general shape is shown in the photograph. It should be just long enough to extend from the axilla to the seat of the chair on which the patient sits. It is best held in position by a belt around the pelvis and a figure eight flannel bandage about the shoulders crossing back of the neck. A pad should be placed in the opposite axilla to prevent excoriation of the skin by the bandage.

During the first twenty-four hours and afterwards, if worn at night, the arm should also be lightly bandaged to the projecting part of the splint. Additional security is given by the application of a swathe which may be pinned to the bandage of the axilla.

When properly adjusted it is perfectly comfortable. Unless it is comfortable it is useless. The use of the splint is not essential and is even harmful if not skillfully cared for.

were treated by the use of this splint. After the adhesions were broken it was applied as described in the former paper, and allowed to remain on from one day to one week. Once or twice a day it was removed, and the arm gently moved without allowing the tuberosity to come out from under the acromion. Usually the patient could hold it actively in complete abduction even on the first day. In some cases the ability to go through the full arc of abduction was thus obtained from the very first, much to the surprise and satisfaction of the patient. In most cases, however, in the second or third week there came a discouraging time when the soreness again made motion difficult. At this time it required much time and encouragement to make the patient keep up the motion. In some cases I again used the splint for rest during the day, and took it off at night.

On the whole this method of treatment, although invariably efficacious and more satisfactory than simple rupture of the adhesions, was a very arduous one for the surgeon, and caused a good deal of complaint from the patients. In many cases the patient's friends on seeing the poor arm constantly held up in the air, suffered more than the patients themselves. The splint, in order to be comfortable, required frequent adjustments which the nurses and house-officers were not experienced enough to give.

For this reason, and because I have heard of serious complications (paralysis) in the hands of other surgeons, I have recently endeavored to obtain abduction by tying the patient's forearm by means of a forearm splint to the head of the bed. This is almost as efficacious, although also requiring a good deal of attention and obliging the patient to keep his bed for several days. As will be shown in the discussion of Group C it is doubtful if even this is necessary, for Baer and Painter claim better results than mine without the use of abduction; and in a number of cases of Type III, I have incised the bursa and then allowed the arm to heal in abduction, without loss of motion.

In considering the methods of treatment under Group B we may then say that as a whole they diminish the period of pain and convalescence, but are far from satisfactory as being painful to the patient and requiring a disproportionate effort on the part of the surgeon and attendents.

Group C, illustrating Cases of Type II treated by excision of adhesions and abduction:

Case 15. *Adherent case in vigorous woman.*

Duration three months when first seen.

Treatment. Incision into bursa and fixation in abduction.

Result. Great immediate improvement. Complete recovery in six months.

Mrs. M. J. S. Age 54. Referred to Massachusetts General Hospital by Dr. W. H. Downey in May, 1905.

Stout, well developed woman of healthy appearance. Twelve weeks ago fell forward on arm. At the time it did not hurt much, but next day it was swollen and painful about the shoulder. At the time of examination she presented the characteristic symptoms and signs of Type II.

Operation at Massachusetts General Hospital, May 10, 1905. Operation, vertical 3–4 inch incision in bursa at outer side of critical point. An adhesion found on critical point so firm that it had to be cut. In external rotation this adhesion appearing like a firm band could be brought into view in the wound, and when cut under tension allowed external rotation to take place with only a few crackles. The finger was then introduced into the bursa, and other adhesions separated. Abduction could then be readily accomplished. Inspection of the critical point showed that there was no rupture of the tendon, as was expected, but palpation showed that there was a tear in the capsule between the tendons of the supraspinatus and the subscapularis. Through this the finger could be passed into the true point. (After operation arm was fixed on abduction splint.) On the third day after operation the arm could be passively elevated to its full extent, and when once elevated could be held in this position by the patient.

Convalescence was normal, and Zander exercises given during the summer by Dr. Boehm. On November 10th

the arm was practically normal. On June 6th, 1906, the result was perfect.

Case 16. *Vigorous man of 51. Symptoms at first of Type I, then of Type III, and finally of Type II.*

Duration one year when first seen.

Treatment. Incision into bursa, excision of adhesions and fixation in abduction.

Result. Complete recovery in six months, although arm could be abducted and used even three weeks after operation.

Mr. C. A. C. Age 51. Referred by Dr. Douglas Graham, in January, 1904.

Stout, well built, vigorous business man. About twenty years ago had severe attack of acute articular rheumatism which crippled him for several years, but from which he completely recovered. In February, 1904, was trying to swing a heavy bag to the platform of a car, when he felt something snap in his shoulder. The injury was not severe, but caused a considerable amount of pain on motion and at night. As it did not wear off, he went to Dr. Graham for massage. During the next six months he received about twenty-five treatments with some benefit, but the trouble was not completely relieved. He then gave up treatment for a number of months, but the soreness and pain persisted. In December, 1904, I saw him in consultation with Dr. Graham, and took an x-ray of the shoulder which was negative. I could then make no definite diagnosis. I saw him again in March, 1905, the symptoms having become rather more pronounced. The condition was characteristic of Type III, *i. e.*, the full arc of motion was possible, but there was a painful jog in it. Exploratory operation on the bursa was advised but refused.

The pain and soreness became worse and atrophy of the spinati and some limitation of motion had appeared by April 11th, 1905, when I next saw him. I then arranged, with the assistance of Dr. G. O. Clark, an adjustable abduction splint which the patient could wear at times during the day and in the evening. I hoped by this device to give the sore point rest, so that a good night's sleep might be obtained. At first it was of some benefit, but a great deal of pain continued.

I did not see the patient again until June 10th, 1905, when he was brought to me by Dr. Stevens of Cambridge. Some weeks before he had waked in the night with intense pain in the shoulder, and Dr. Stevens, his family physician, had been hurriedly called. The shoulder was found to be in a very acute condition (Type I), so that the slightest motion caused great pain. To obtain relief, Dr. Stevens was obliged to fix the shoulder by the application of a sling and circulars. He also blistered the point of the shoulder. Passive and active motions were out of the question, so great was the pain and tenderness.

On July 10th I found the condition characteristic of Type II, but a considerable degree of tenderness and muscular spasm persisted. The muscles of the shoulder and arm had become atrophied and the patient's general condition had become wretched. He looked worn and haggard from pain and loss of sleep, and was glad to consent to an operation.

Operation at Eliot Hospital, July 13th, 1905. Ether. Two inch incision over anterior portion of bursa between fibres of deltoid. Surfaces of bursa found adherent to within $\frac{1}{4}$ inch of edge of acromion. Adhesions so firm that they had to be divided with knife and scissors before tuberosity could be passed under acromion. Base of bursa lumpy and irregular; these lumps were smoothed off with scissors. By pulling down on arm, finger introduced into subacromial portion of bursa and a few light adhesions broken up. Neither the walls of the bursa nor the separation between the fibres of the deltoid were suturated, with the hope that the serous and bloody drainage would be absorbed by the subcutaneous tissue. The skin was closed with silkworm gut. The arm was then bandaged to an abduction splint.

After the operation there was a good deal of pain and much discomfort for several days. From time to time the splint was removed and readjusted, and even on the first day the patient could actively hold the arm abducted while the splint was being repadded. Within a week the humerus could be slowly brought to the side and again abducted. Primary union. He left the hospital on the twelfth day. Steady improvement in respect to the amount of pain and increase in strength followed. His convalescence was aided

by massage by Dr. Graham and exercises with the Zander apparatus.

On December 7th, 1905, he could use the arm quite freely except for occasional slight twinges of pain. Examination showed normal motion except that the right hand could not be carried quite so high between the shoulder blades as the left. The patient has been seen since from time to time, and has remained well.

Case 17. *Adherent case. Well built man in debilitated condition. Duration two years when first seen.*

Treatment. Incision and manipulation under ether and Zander exercises.

Result. Recovery in four months.

Mr. J. N. Age 40. Massachusetts General Hospital, June 10th, 1906.

Fairly well developed and well muscled thick-set individual. Looks worn and tired, but not in ill health. For twenty years has been a shoe laster and has used his right shoulder constantly in his work. Two years ago it began to trouble him by soreness and lameness. Six months ago he had the grip and was obliged to quit work for three weeks. During this time his shoulder became much worse. It was with great difficulty that he was able to keep on with his work until ten days ago, when he could stand it no longer. Has a wife and six children dependent on him, evidently plucky, but has reached the end of his endurance. In spite of blistering, hot water, turpentine, etc., the shoulder has grown worse.

Examination shows characteristic limitations of Type II. There is a certain amount of puffiness over the region of the bursa, and tenderness over the tip of the tuberosity just external to the bicipital groove. Great atrophy of the spinati. Cannot put hand behind neck or back, etc. Pain is at the usual distribution on the outer side of the biceps, about the insertion of the deltoid, and is much worse at night so that he is unable to obtain restful sleep.

Operation under ether at the Massachusetts General Hospital, July 7th, 1906. Incision on point of shoulder between the fibres of detoid. The subdeltoid portion of bursa firmly adherent. Adhesions in this portion and in subacromial portion broken down with finger and by manipu-

lations. Skin closed without suturing the bursa or muscle. Abduction splint. Convalescence was normal and fairly comfortable. Splint was kept on most of the time for six days, and the patient was discharged from the hospital on the eighth day. On the third day motion, although painful, could be carried through the normal arc.

After leaving the hospital the patient returned occasionally for treatment with the Zander apparatus until August 14th. At about this time his wife was taken sick and he was obliged to discontinue treatment. However, he did keep up exercises at home for some time longer. A certain amount of pain continued through the summer, but there was steady improvement and he went back to work in the middle of October. He states that he was perfectly well by November and has remained well since.

When seen on March 28th, 1908, the shoulder was perfectly normal in every respect, except the lack of a few degrees of motion in extreme external rotation. In this case, as in most of the others, there was a period between the second and fourth week when the limitation was more pronounced than immediately after the operation.

DISCUSSION OF TREATMENT ACCORDING TO GROUP C.

As explained under the previous heading I have in some cases thought that incision into the bursa, and division of the adhesions, offered a safer method than blind rupture of the adhesions under an anæsthetic. In cases 15, 16 and 17, this method was followed, and although at first sight in reading the records one would be inclined to say that the evidence in favor of this method was not strong, yet my personal feeling is that considering the severity of the cases the results were fairly satisfactory. It is my impression that these cases suffered less and obtained the actual functional use sooner than did the cases of Group B, although complete recovery took place in practically the same time.

The cases reported by Painter and Baer recovered in even a shorter time than any of mine. Both Painter and Baer claim to have excised the bursa, adhesions and all.

They must mean excision of the subdeltoid portion only, for even in the cadaver it is impossible to excise the whole bursa. However, their treatment differed from mine in the post-operative use of adduction rather than abduction. If their position makes the difference it will simplify the treatment greatly.

It is also rather difficult to define recovery. In some cases pain persists even when good motion is obtained, and in others the reverse is the case. A case may recover to the point of not being troubled by the arm, and yet be unable to use it freely in his usual occupation. Often the patient considers himself well, and yet lacks fifteen or more degrees of the full extent of abduction and external rotation. Finally, cases may be perfectly well in point of function and pain, and yet show decided atrophy of the spinati of which they are entirely unconscious.

Therefore, there is a large margin for difference for the factor of optimism on the part of the surgeon. In the cases I have here reported I am quite sure that I have not erred on the side of optimism, and have reported in some instances slight twinges of pain, and barely perceptible atrophy which practically were negligable. In the severe cases, no matter how successful their treatment, the question is one of months not weeks, if these minor points are considered.

What the practitioner and the patient consider recovery is the ability to do back hair, button suspenders and sleep the night through without pain. I am quite sure that the operative treatment is much more satisfactory in these respects than other forms.

In speaking of the treatment of Type II as a whole, I feel that it is largely a matter for the patient to make the choice between his dread of a comparatively simple and harmless operation and the prospect of pain and incapacity for several months. Where the pain is great, operation will be a great relief; but where there is no pain, and the disability

does not interfere with the patient's occupation, the cure may be left to time, and assisted by massage, exercises and manipulations by the physician.

TYPE III—TREATMENT.

Cases due to an irregularity in the surface of the bursa.

In speaking of prognosis I alluded to the fact that cases of this type were very variable. Many persons have marked crepitus and jerky motions of the shoulder, due to the chronically thickened folds in the bursa. In some cases these folds give pain, in some they do not. When the amount of pain justifies operation an exploratory incision may be made, and the offending irregularity removed. Thickened folds, fringers, small osteophytes, calcareous deposits in the base of the bursa, etc. will be found.

The operation is a trivial one if the anatomy of the region is well understood. Cases of this type which consult me, even if advised to have an exploratory operation, seldom consent, because I always give a good prognosis without operation. Much relief is experienced from a mere knowledge that the trouble is not serious. Excepting operation, I know of no more effective treatment than massage.

Cases illustrative of Type III in which no operation was done:

Case 18. Dr. R. W. Age 62. Referred by Dr. J. J. Putnam on June 7th, 1905.

Patient is a large vigorous looking physician in active practice. Considers himself nervous and rheumatic. Is apt to have pain in his joints. Once had a similar localized pain in his knee. Began to have this present trouble in March, 1905. He had normal motion, exeept that in certain positions of the arm there is a distinct "crick" which is very painful. In abducting the arm, instead of raising it smoothly he has to twist it about to avoid producing the pain. Is apt to rotate it internally, and then elevate it. The "crick" does not occur every time he abducts, but may occur at any time, often unexpectedly. Sometimes when he is at table

a simple motion like reaching for a salt cellar will produce the pain. At other times the leaning forward to shut a drawer with his outstretched hand will produce it. Frequently it pains in a dull way at night, so that he has to put a pillow under the arm to get comfort; cannot sleep on the side of the lesion. No localized tenderness except when pain occurs. Ordinary treatments had been ineffectual, but the symptoms were not severe enough to demand operation.

Patient was seen again in spring of 1906, when he stated that the symptoms had lasted about six months and then had disappeared. Recently he tells me that he has since had several attacks of the same trouble, but that they have not lasted more than a few weeks.

Case 19. Mrs. A. B. R. Age 56. Referred by Dr. E. E. Bancroft on September 4th, 1906.

In February, 1906, had what she considered a trivial injury to the shoulder and felt something snap. Not much pain at the time, but it persisted and grew worse, so that in April she called Dr. Bancroft. At this time she had a great deal of pain at night, could not lie on the affected side (right), and was obliged to sleep with a pillow under the arm.

When seen by me on September 4th the above symptoms had continued. She also complained of weakness of the grasp of her thumb and fore finger. The pain was very troublesome and prevented a good night's rest. There was tenderness over point of the shoulder, which disappeared under the acromion when the arm was abducted. The full arc of motion was not limited, but was not perfectly regular when the tuberosity passed beneath the acromion.

The condition was explained to her, and she was much relieved to know that the symptoms would probably disappear without any serious condition coming on. I have recently heard that she has much improved.

Case 20. Mrs. J. O. F. Age 42. Referred by Dr. Bullard on February 6th, 1907.

Well developed, healthy-looking woman. A year and a half ago began to have twinges of pain in the right shoulder, especially during certain motions, as in putting on coat and doing hair. Until within two months it was more

annoying than painful, but has recently been severe, especially when lying down. Symptoms and signs are characteristic of Type III.

The condition being explained to her, and assurance being given that no serious trouble would result, she preferred not to have an operation.

On June 12th, 1908, she reports that the arm gave a great deal of trouble after I saw her for about three months. Since then it has been less severe, but she is conscious of it most of the time.

Illustrative Cases of Type III in which an Exploratory Operation was Done.

Case 21. *Adherent case in hysterical Jewess. This case might be classified also as a case of Type I, as it was an acute exacerbation of chronic symptons. The limitations were characteristic of Type II or a very acute Type I.*

Duration. Chronic symptoms several years — acute symptoms a few days.

Treatment. Incision into bursa and fixation in abduction.

Result. Paresis (hysterical ?) of flexors of forearm. Recovery of shoulder within three months, but contracture of little finger persisted one year later.

Mrs. J. K. Age 44. Massachusetts General Hospital, October 24th, 1905.

Patient is an extremely neurasthenic Jewess who has previously attended the Out Patient Department for gastroptosis. She has had some pain in the shoulder for several years, but a few days ago without trauma it became much worse, and the shoulder became tender and swollen.

Examination showed the characteristic symptoms of Type II, except that there was an indefinite swelling of the region of the bursa and more than usual tenderness. The patient was apprehensive and absolutely without courage, and from the first to last gave me as little aid as she possibly could.

Operation October 26th. Ether. The bursa was opened by an anterior incision. It contained an excess of straw-colored fluid and fibrin. The walls of the bursa were as thick as blotting paper, and of a pinkish yellow color.

Cobweb-like adhesions stretched from floor to ceiling. The adhesions were clipped out, some of the bursal sac removed, and the skin wound closed without suturing the bursa. Abduction splint.

After the operation the patient remained in the hospital a week, most of the time using the splint, which was frequently readjusted. Her cowardly and apprehensive temperament made the after treatment very difficult, but in spite of this the shoulder did well. She could not or would not use the hand, wrist or elbow unless I stood over her and insisted. Under sufficient urging she could use all the muscles, but when left to herself she would let the hand lie in her lap as if it were dead. By Nov. 10th she had recovered enough courage to begin treatment with the Zander apparatus. This was continued at intervals until the following spring.

From the first the shoulder did well, but the hand and fingers were slow in improving. Repeated examinations by Dr. Boehm and myself failed to demonstrate any definite nerve or muscle lesion. We considered it an hysterical paralysis, but in the light of the ultimate result I am inclined to think that it was a case of Volkman's ischemic paralysis.

The patient was again seen on September 8th, 1906. The shoulder was symptomatically well, but on careful examination showed about 20° of limitation in external rotation. There was still an evident contracture of the little and ring fingers and a flabbiness of the ulnar flexors.

Case 22. *Nervous, well-muscled man of 54. Characteristic severe case of Type III.*

Duration of acute symptoms two months when first seen. Chronic symptoms had been present a year.

Treatment. Incision of bursa by Dr. C. A. Porter.

Result. Could return to work in three months. Slight limitation of motion persisted a year.

Mr. G. E. G. of Haverhill. Age 54. Massachusetts General Hospital. April 6th, 1906. Spare, well-muscled, nervous man. Works in a shoe factory, doing exactly the same work day after day. This work involves raising and lowering right arm continuously. About a year ago he began to have pain in the arm, especially while using it

and at night. The pain gradually increased until two months ago, when it became so severe he could no longer work. He had become much debilitated. Examination showed that the motion of the arm was normal in extent, but that there was a painful jog in abduction. There was tenderness at the typical point on the tuberosity just external to the bicipital groove.

Operation by Dr. C. A. Porter on April 7th, 1908. The bursa was opened between the fibres of the deltoid. "No fringes nor villi found in bursa, but the surface deeply injected in places with sharp line of demarcation from normal surface. Injected granulating areas touched with carbolic. Bursal sac sewed up with chromic catgut." The arm was put up on an abduction splint for a week. For the next two days it was worn only for a portion of the time, and omitted on the ninth day. On this day there was good motion in the arm. He left the hospital on the eleventh day.

He came under my care again about two months later. After the operation the pain had ceased, but after his return home the shoulder became very stiff and continued so in spite of occasional Zander treatments and exercises at home. On June 22d, 1906, he presented the characteristic limitations of Type II, although the range of motion was somewhat greater than usually found in Type II. He also complained of more or less pain. Under Zander treatment he gradually improved, so that on July 13th, 1906, he was able to return to work. On this date external rotation and abduction were about two-thirds of normal. On April 22d, 1907, the following note was made by Dr. J. D. Butler in the Massachusetts General Hospital records: "Good scar. Motions of arm limited only in extreme abduction. Can get arm but little above line of shoulder in abduction. No pain or tenderness. Can work as well as ever with arm. Other shoulder is now giving similar symptoms."

Case 23. Mr. D. S. Age 65. Massachusetts General Hospital, August 7, 1905. Thin, nervous, tobacco-soaked, Italian cigar maker. For six months has had pain in the right shoulder and sometimes in the left. Characteristic symptoms and signs of Type III, the irregularity of motions and pain being particularly noticeable when the arm is lowered.

Operation at the Massachusetts General Hospital. Usual incision. Bursa incised and lips of wound retracted. On the base of the bursa was a small spicule of bone of triangular shape and resembling a tooth, perfectly bare of periosteum and protruding through the tendon of the supraspinatus. There was no inflammatory reaction about it and the bone itself seemed to be simply an eburnated osteophyte arising from near the anatomical neck. It was easily clipped away with one bite of the rongeur forceps. The wound was closed in the usual manner and the arm fixed in abduction by strapping a forearm splint to the head of the bed.

Convalescence was normal with very little pain and there was almost immediate relief of the symptoms. After the operation there was no interference with motion at any time. When seen on August 28, 1906, he complained of occasional twinges similar to what he had before the operation. A few weeks later even these had disappeared. On August 22, 1907, examination of the shoulder showed normal motion and no tenderness. The patient stated that the operated shoulder was better than the other one, but that there was occasional pain in both shoulders. There was no abnormality of any kind except an unusual amount of creaking in the joint during abduction.

Case 24. Miss G. G. Age 15. Referred by Dr. Boland of South Boston, on February 12, 1908. Tall overgrown girl in good general health with unusually loose and limber joints.

For two years has had pain in right shoulder and down the arm. Constant complaint of pain in doing hair, buttoning back of waist, etc. Pain is also troublesome at night, enough to interfere with regular sleep. In certain uses of the arm a sharp painful "click" occurs. To avoid this "click" the patient has grown accustomed to twist the arm as she abducts it and to abduct the scapula on the humerus before elevating it. When lowering the arm she keeps the scapula abducted on the humerus until the arm is almost at the side, and then allows the scapula to come into adduction with the humerus. As this motion occurs there is a distinct hitching as if the joint was set on a ratchet. The fingers held over the bursa during this motion detect a distinct irregularity of surfaces on the tuber-

osity. The whole shoulder joint (as well as all her joints) is abnormally loose and flail like. There is a tender point on the tuberosity which disappears beneath the acromion in abduction. The symptoms have persisted in spite of careful general care and massage. By the kindness of Dr. C. L. Scudder I was able to operate on the patient in his service at the Massachusetts General Hospital.

Operation March 28, 1908. Usual incision into the bursa. The surface of serous membrane is not particularly abnormal in appearance except for a number of redundant folds, one of which is so large as to produce an obstruction to motion as the tuberosity passes under the acromion. This fold was tough and fibrous in feeling as if containing chronic inflammatory tissue. Several redundant folds were excised and the incision closed as usual. Convalescence was normal and good use of the arm was obtained by the third week.

On June 12, 1908, examination on this date shows no abnormality in motion of arm except a very slight irregularity of motion as the tuberosity passes under the acromion. There is no pain and the patient has been practically well since the third week after the operation.

Although not strictly cases of Type III there are certain cases to which Painter has called attention which show in x-ray pictures a deposit of calcareous material in the neighborhood of the bursa. I had the pleasure of seeing Dr. Painter operate on one of his cases (Case III, W. P. D.) on May 17, 1905. Immediately after the operation I made the following notes on the case.

The patient, Dr. D——, is a man of 37 years of age, of heavy (200 pounds) physique and plethoric constitution. His previous history is unimportant, except that 10 years ago after playing baseball all one summer he used to have a great deal of pain and soreness in his right shoulder joint. Since that time he has had at intervals a great deal of pain and tenderness in the joint. The pain bothered him particularly at night and was at times severe enough to prevent his sleeping well. He stated that until within a few days he had been able to move his arm without any trouble in all directions; for instance, behind his neck, behind the back

and over his head, without especial pain. There have been times, however, when it was difficult for him to raise the hand over his head, but when it was once put in this position it was comfortable for a time. He used to occasionally put it in this position at night; after lying with the hand behind his head for some time, he would then put it down by his side again. In doing this there was always pain during the motion. He recalls at times having his wife wake him just as he was going to sleep with his hand behind his head and tell him to put it down by his side, so that he would not go to sleep in that position and find it stiff on waking. External and internal rotation of the arm could be gone through without giving any trouble whatever.

Eight days ago while in New York he suddenly noticed that the point of his shoulder was tender and painful and that the motions were much restricted. He could with difficulty get into his clothes, but could not reach his hip pocket as he had been accustomed to. During these days the soreness had persisted and there had been great pain, sufficient to prevent sleep at night and to require large doses of morphine; the only comfortable position was sitting with the elbow supported. The pain was so great as to make him desire immediate operation.

Examination showed that the external and internal rotation of the humerus on its long axis is restricted about one half the normal arc. Abduction or elevation of the arm is impossible on account of the pain caused in the neighborhood of the greater tuberosity. Attempts at passive elevation of the arm showed that the scapula moves in conjunction the humerus.

An x-ray from the posterior view shows a pyramidal shadow in the region of the subacromial bursa just above the greater tuberosity and external to the tip of the acromion, the base of the mass being downward and about an inch in length. Between the base and the greater tuberosity is a translucent band about a quarter of an inch wide, occupying the position normally occupied by the tendon of the supraspinatus. The mass is apparently in such a position that the tuberosity could not ride under the acromion without compressing it.

Operation, by Dr. C. F. Painter, May 17, 1905.

Under the impression that the mass shown in the x-ray was caused by a calcification either of the bursa or its base, a vertical incision of about two inches in length was made through the skin and between the fibres of the deltoid on the point of the shoulder over the greater tuberosity. When the fascia beneath the deltoid was reached a small opening was made in the subdeltoid bursa, and this was enlarged with scissors to an extent great enough to admit the fore finger. The aspect of the bursa was not abnormal inside except for some firm adhesions anteriorly which made it difficult to separate the plane of the bursa from the neighborhood of the bicipital groove and the anterior part of the greater tuberosity. With the finger in the opening, it was found that during the rotation of the humerus, a mass corresponding to the shadow seen in the x-ray could be felt to pass beneath the finger. This mass evidently lay at the base of the bursa on the top of the greater tuberosity. An incision was made into it permitting the escape of about half a drachm of sebaceous material resembling the contents of a dermoid cyst. The cavity which resembled a wen or dermoid was thoroughly curetted and the walls excised. The base of it was evidently the tuberosity and tendon of the supraspinatus; the roof was the base of the bursa. When the sac had been entirely removed, it was found that the motion of the joint under ether was perfectly normal, rotation and abduction being easily performed. The incision in the bursa was not closed and the skin was drawn together with silkworm gut and the arm put in the ordinary sling position.

Remarks:

The point of particular interest in this case is the persistence of the function of rotation in spite of the limitation by abduction. It is obvious that the position of the cyst allowed rotation with comparative freedom, but that attempts at abduction would crowd the cyst between the greater tuberosity and the acromion process and caused pain and spasmodic rigidity of the joint. The acuteness of the symtoms within the last eight days are explained by an inflammatory condition in the cyst. The previous attacks were probably due also to the same cause. That this inflammation did not involve the bursa to any great

extent is shown by the persistence of rotation. Since the bursa was not inflamed it would be readily seen that the symptoms which the patient complained of in regard to going to sleep with the arm behind his head can be explained, for the cyst having once got under the acromion was relieved of pressure. In other words, it was only when the cyst was inflamed by over exercise that the presence was noticeable, unless elevation of the arm crowded it between the acromion and the tuberosity.

The relief obtained by this operation was immediate and permanent.

It will be seen by comparing these notes with the description of the operation by Dr. Painter that the calcareous deposit seemed to me to lie not in the bursa, but beneath its base, and in or adjacent to the tendon of the supraspinatus.

I have recently had another similar case in which the calcareous material lay in the same relation to the bursa. Although these are the only cases which I have seen operated on, I have seen this appearance a number of times in the x-ray. Dr. Painter agrees with me on the importance of calling attention to the probable error in his description, for unless the surgeon realized that the mass was beneath the bursa, it might escape his attention.

Case 26. Mrs. E. B. S. Age 38. Referred by Dr. D. T. Percy on May 19th, 1908.

Small, wiry, poorly-developed woman. Previous history negative, except that eight years ago had a pelvic operation, probably for pyosalpynx.

One morning, five weeks ago, suddenly found that she could not raise her left arm naturally. She thought that she must have slept on it, and kept on using it as well as she could. The pain began to be severe and prevented rest at night. The pain was localized to the left shoulder, down the outer side of the arm, and about the insertion of the deltoid.

The tender point, extent of limitation and atrophy, were characteristic of Type II. An x-ray plate, taken at the Homœopathic Hospital, showed a dense shadow between the tuberosity and the acromion in the region of the supraspinatus tendon and bursa.

Operation at Eliot Hospital, May 25th, 1908.

Incision on the point of shoulder, deltoid fibres separated and bursa carefully opened. The serous membrane was reddened and thicker than normal. On the floor of the bursa, over the insertion of the supraspinatus, at the point indicated by the dense shadow in the x-ray, was a rounded elastic-feeling elevation of about 2 cm. in diameter. This lesion was entirely beneath the bursa, the floor of which had to be incised. The mass consisted of yellowish granular material, resembling the contents of a wen or of a cheesy gland, but more crystalline in character. This material lay on and in the substance of the tendon of the supraspinatus, just at its insertion into the tuberosity. There was a zone of subacute inflammatory tissue about it of about one half cm. thickness on the periphery.

The granular material was curetted carefully away, and the inflammatory zone and most of the subdeltoid portion of the bursa removed with scissors and pared away with a knife. The skin was sutured except for two provisional stitches, but no attempt was made to suture the muscle, the separated fibres of which tended to come together. When the small tumor had been removed motions were free without breaking any adhesions. Convalescence was normal, and she left the hospital in a week with the arm in a sling. No attempt was made to keep the arm in abduction.

Careful cross questioning after the operation brought out no history of injury, but that there had at times been rheumatic pain in the arm. The only cause for chronic irritation had been stenographic work some years before. (I have a number of times seen cases of subdeltoid bursitis in people whose occupation obliged them to use their arms in a slightly abducted position, so that the supraspinatus is obliged to remain continuously in action. This attitude is necessitated in piano-playing, stenography, hand-sewing, and many other employments. Such an attitude makes a continuous demand on the tendon of the supraspinatus, and if the latter becomes either swollen or atrophied an irregularity of the contour is brought about.)

This patient is still under treatment, but on June 12th, 1908, less than three weeks from the date of the operation, the patient states that she is already much better than be-

fore the operation. No effort has been made to keep the arm in abduction.

Analysis of the granular material shows that it is chiefly calcium phosphate.

Dr. Wright reports as follows: "Microscopical examination of the material from your case of 'sub-deltoid bursitis' shows the following:

The main constituent of the material is a coarse, dense, fibrous tissue. Associated with this is a looser connective tissue in which are enclosed blood-vessels and a good many cells of the lymphocyte series. The coarse fibrous tissue in some places contains more fibroblasts than elsewhere, and may therefore be considered to be in process of growth at these points. In a few places it is necrotic, and it contains very few blood-vessels. I cannot find any evidence of tuberculosis. The material seems to me to show a slow productive inflammatory process combined with degeneration and necrosis similar to the process observed in the heart valves in some cases of chronic endo-carditis."

To sum up the question of operative interference in cases of lesions of the subacromial bursa, whatever their type, it may be said justly that in a class of cases where we may expect a spontaneous cure in the course of a few months, or at any rate in a year or two, that it is meddlesome surgery to interfere, considering the usual dangers of sepsis and anæsthesia which attend any operation.

Certainly it is not the writer's intention to insist that these cases should be operated on, but no one can see the agony which some of them endure without wishing to relieve them. The consent to permit operation is a matter of temperament; some people preferring to suffer night after night rather than permit it, while others seek it rather than suffer a few weeks.

I believe that with improved knowledge and technique, confidence in the efficacy of this simple operation will become more general, and the surgeon will be willing to urge operation rather than simply consent to do it.

SUMMARY.

1. The subacromial bursa and the supraspinatus muscle are of essential value in abduction of the arm.

2. Lesions of the subacromial bursa and of the tendon of the supraspinatus are the common causes of stiff and painful shoulders.

3. Many cases which pass under the diagnoses of contusion of the shoulder, neuritis, periarthritis, circumflex paralysis and muscular rheumatism are in reality due to lesions of these structures.

4. The final prognosis of these cases is good, but when pain is severe or disability is great, relief may be obtained by a simple operation of little danger.

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ARTICLE XVIII.

X-RAY PLATES OF FRACTURES.

By CHANNING C. SIMMONS, M.D.
OF BOSTON.

READ JUNE 9, 1908.

EXHIBIT OF X-RAY PLATES OF FRACTURES.

I wish to call attention to the exhibit of x-rays in the Exhibition Hall, which will be on view until the close of the meeting. This exhibit is furnished by the Massachusetts General Hospital, and the plates were chosen from the collection to show the typical common fractures of all the bones of the body. The plates represent the routine work of the hospital, and were not especially taken for exhibition purposes.

The aim of the collection is to show most of the common fractures the physician in general practice is called upon to treat, and a few of the rarer fractures that are at times overlooked.

At present a radiograph of practically every fracture should be taken as a routine measure, at some time either before or after primary treatment. It is to the best interest of the patient, who never begrudges the extra expense, and is also a safeguard to the physician. The plates, however, should be interpreted by a man conversant with the appearance of the normal bones and joints, as it is very easy to confuse a distorted radiograph due to an error in the technique in making, or in young subjects a normal epiphysis for a dislocation or fracture. The patient is often apt, unless the condition is explained to him, to draw erroneous conclusions from the plates, for in the best "set" fracture of, as for instance of the leg, there is usually at least one-half inch displacement, which is magnified in the radiograph, when clinically the ultimate functional result will be perfect.

When possible, two views of all fractures of an extremity should always be taken; one antero-posterior, and one lateral, for, as a radiograph is only a projection, it is neces-

sary to see it from two different points to determine the displacement. This is well illustrated by several of the plates, — the antero-posterior view showing the bones in apparently perfect position, while the lateral view shows a great deal of displacement.

Radiographs of fractures are important in three ways. First: in certain cases they are of great aid in determining the diagnosis, as in injuries to the elbow, shoulder or wrist, where a diagnosis cannot be made without an ether examination and considerable manipulation, and even then often not satisfactorily. In other cases, as in fractures of the shaft of the humerus or femur of both bones of the lower leg, the diagnosis is obvious. After reduction and application of splints and other apparatus, the x-ray in this second group is of more importance than before treatment, showing whether reduction has been satisfactory, and allowing the surgeon to correct slight deformities.

The third value is as an aid in determining in old fractures with faulty or delayed union, the exact cause of the condition. In many cases it gives no new knowledge, but when showing separation of the fragments may confirm the diagnosis of interposition of muscle or fascia. In other cases, the presence of a loose fragment may be determined, or faulty union, or large callus involving, for example, in the forearm both the radius and ulna.

The plates in the exhibit are labelled, and are self-explanatory. There are a few plates, however, of fractures rather commonly overlooked, and which most text-books dismiss with a word, to which I wish to call especial attention.

Fracture – head of radius. A fracture of the head of the radius into the elbow joint is not an uncommon injury. In some cases the result after immobilization is good, but in a certain number there is marked loss of pronation and supination. In the latter class, excision of the fragment gives a good result.

Dislocation—semilunar bone of the wrist. The condition is comparatively rare, but much more common than most articles would lead one to believe. It is usually mistaken for a Colles' fracture, or fracture of the radius. The cardinal symptoms are a bony prominence on the anterior surface of the wrist rather higher than one would expect, and inability to extend the fingers. Treatment consists of reduction when seen early, or excision of the bone in old cases.

Fracture—scaphoid of wrist. This is a comparatively common injury, often mistaken for a sprain. In cases of injury to the wrist, where no bony deformity is apparent, but where there is marked tenderness in the anatomical snuff-box, and where hyperextension causes more pain than other movements of the wrist, the condition should be strongly suspected. Treatment consists in immobilization for three or four weeks, usually without union. If no union and much disability, excision of the fragment should be practiced.

Colles' Fracture. The plates of the two cases shown in the exhibit show all the deformities well,—namely, the impaction and backward displacement, the lateral displacement, and the tilting backwards of the articular surface of the radius. This last displacement is the one least often corrected in reduction, and is probably responsible in great measure for the silver fork deformity, where the relation of the styloids of the radius and ulna is normal.

The only other point I wish to call attention to is the uniformity with which the plates show in the long bones the displacement caused by the action of the muscles, and the relation of their attachment to the point of injury. A striking example of this is seen in the displacement in the supra-condylar fracture of the femur, in which the action of the gastrocnemius has pulled the lower fragment sharply backward.

ARTICLE XIX.

THE ANNUAL DISCOURSE.

THE BLOOD IN SURGERY.

A HISTORICAL AND CRITICAL STUDY.

By JAMES G. MUMFORD, M.D.
OF BOSTON.

DELIVERED JUNE 16, 1909.

NOTE.—At an Adjourned Meeting of The Massachusetts Medical Society, held Oct. 3, 1860, it was

Resolved, "That The Massachusetts Medical Society hereby declares that it does not consider itself as having endorsed or censured the opinions in former published Annual Discourses, nor will it hold itself responsible for any opinions or sentiments advanced in any future similar discourses."

Resolved, "That the Committee On Publications be directed to print a statement to that effect at the commencement of each Annual Discourse which may hereafter be published."

THE BLOOD IN SURGERY.

Mr. President and Fellows
of The Massachusetts Medical Society: —

There are three commonly accepted methods of studying a problem—whether that problem be a political propaganda, a question of social science, a biological puzzle, a piece of medical research, or an undertaking in practical mechanics. These three methods we call severally, (1) the inductive method of the scientist; (2) the practical method of the technical craftsman; and (3) the literary method of the student. Take, for example, the steam-engine as a problem to be investigated: — The scientist, the properly trained physicist, studies the force-production of coal, and the expansive power of steam acting upon a complicated mechanism of steel for the accomplishment of work; on the other hand, the technical craftsman, the trained mechanic, is concerned with the construction of the apparatus, the firing of its boilers, and the setting it in motion; while by the literary method, the student of mechanical power as applied to the development of civilization looks to remote causes, and to effects immediate and remote. He reviews the observations and hypotheses of the ancients; the vagaries of the mediæval alchemist; the crude practical endeavors of the early moderns, and so he comes down to the accomplishments of Watts and the Stevensons, and grasps the significance of those prophets of modern industry; while he summarizes and assigns to their proper perspectives the vast individual factors in the complex of modern life as affected by steam-power; foreseeing perhaps—or attempting to foresee—the

bearing of it all upon the mechanic arts of the future and their influence upon the history of the race.

These three methods of study are applicable as well to medical problems, and the three classes of workmen find their labor in appropriate fields: The pure scientist investigates in his laboratory questions of biology; — of physiology, anatomy and chemistry as concerned with the problem in hand. The technical craftsman, or *practical clinician*, as we call him, carries to the sick-bed the findings of the laboratory, and demonstrates their significance in the vital field of therapeutics. And finally, by the literary method, the student of medicine as a whole,—of medicine in its wide bearing upon human happiness and progress, adds his quota also to the elucidation of the problem. It is his function to trace out and to collaborate the story of men and of measures; on the one hand to show, in the broad sense, the immense influence which the progress of medicine has had upon the progress of civilization,—medicine's present significance, and its probable future; and, on the other hand and in a narrower sense, perhaps, to trace the growth of our knowledge of special diseases. In this way best, I believe, may one reach a proper conception of the attainments of our predecessors; of the place at which we are arrived; of the value of special research; of the futility of certain lines of endeavor; and of the rate and probable outcome of to-day's progress.

This third method of studying problems in medicine is a method deserving more consideration than we have always given it. We are prone to consign it to the dust-bin of medical history, — of history in the non-philosophic sense; but the study of medical history, properly pursued, means something more than the resurrecting of remote happenings— the dry bones of an emotionless past. Past and present are interwoven closely in such studies. The most successful clinician or investigator of to-day will be the first to appre-

ciate the bearing of past facts upon present problems; while the intelligent recorder of past events must be versed and facile in the conduct of modern research and in the interpretation of clinical facts.

To be specific:—In the following paper I propose—somewhat haltingly, I fear—to consider the subject of the Blood in Surgery, from our third point of view—the point of view of the student of literature. In these days those of us who investigate this matter are busied, some with laboratory studies on the effects of hemorrhage, and on the results of transfusion; and some in applying directly to patients the measures proved useful by laboratory experimentation. Shall not we here properly and timely, therefore, as students of this broad question, review the whole subject as it has developed up to to-day?

The problem of the Blood in Surgery presents certain features, which I shall recall to you; and I shall discuss these features from the historical standpoint as well as from the critical standpoint of the present. We shall consider the *circulation*, *hemorrhage* and *transfusion*, while various cognate matters incidentally must be developed.

Let us turn first to a discussion of the knowledge of the circulation, as it became clear gradually to former physiologists. No subject in the history of medicine is more vital or illuminating. In a former writing, on Aneurism, I have said some little on this matter, but in that writing I was concerned with a field more narrow than that we are now considering.

To the ancients the subject of circulation was truly a mystery, though time and again some prophet arose who thought he had solved it. It is interesting to recall the fact that the great Hippocrates, early in the third century B.C., described the heart as a great muscular engine, though it was not clear to him what purpose the heart served. Yet, five hundred years later Galen taught his Roman students

that the heart is not a muscle. Galen led physiological thought for fifteen hundred years, with the result that his misconceptions regarding the heart turned away to false conclusions hundreds of his successors. This fact is especially surprising when we remember that Aristotle, the great natural philosopher of Greece, soon after Hippocrates, about 340 B.C., had stated that the heart is the central organ of the circulation and is the mover of the blood.

In the light of history we cannot but marvel at the centuries of ignorance and misconception which followed the two assertions of Hippocrates and of Aristotle,—their assertions that the heart is a muscular organ, and that it moves the blood. Unhappily for the progress of physiology, however, Aristotle believed that arteries and veins fulfil the same function* and bear blood equally to the extremities. Erroneous as was his idea, the matter was made worse by Praxagoras, who wrote a generation later, and distinguished sharply between the functions of these two forms of blood-vessels, but distinguished wrongly.

Praxagoras observed that the arteries pulsate, while the veins lie apparently motionless. Thereupon, instead of recognizing the obvious fact that the movements of the arteries are due to the heart's impulse behind them, he asserted that the arteries beat because they are empty of blood, and are moved by a mysterious pneuma, to which he gave the name "vital spirits"—a pneuma much resembling air in character. We all know of this old error, but we must remember that it was an error quickly exploded. To be sure, the conception of these air-tubes led to the adoption of the name *artery*, but the trachea also was dubbed artery, long before that name was applied to any vessel concerned with the circulation.

Galen was the medical philosopher who set straight the the ancient misconception of the arteries' contents. One

* J. C. Dalton: Doctrines of the Circulation. 1884.

is tempted always to dwell upon the life and accomplishments of this extraordinary man—unquestionably the most distinguished scientist of the old world. But we must brush by him, noting merely that he died about the year 200 of our era. He studied and demonstrated physiological phenomena through animal experimentation. He proved beyond peradventure that both arteries and veins contain blood, and that the wounding of an artery or a vein may suffice to draw away all of the life stream. His knowledge of the nature of the circulation was at fault in many other regards, however; and as his writings controlled medical beliefs for nearly sixty generations, and directed many of those beliefs into channels which now seem to us incredibly preposterous, it is worth our while briefly to glance at his teachings.

Galen and his successors were convinced that the great system of veins springs from the liver, whence the venous blood draws its nutritive properties; and that the system of arteries springs from the heart. Those men recognized the fact that both veins and arteries mingle in the lungs, but the significance of that mingling they did not comprehend. Here is a fact, however, regarding the ancient conceptions:—those men seem never to have guessed, or even to have suspected the existence of that thing which we call the *circulation* of the blood. They named the arteries and veins *blood-vessels*, the term which we still employ; but they used the word *vessel* to signify a blood-container, like a pitcher or a bowl. The blood in these vessels—they thought—lies in them as water lies in a lake, and does not course through them as water flows in a river. One asks, naturally, how the blood, especially the blood of arteries, could be discharged in jets when the blood-vessel was wounded. Galen asserted that the arteries in themselves, in their own walls, contain a vital principle, which causes them to dilate and contract. Strangely enough, he appears to have seen no special connection between the contractions

of the heart and the throbbing of the arteries. He did realize, however, that there is probably some communication between the arteries and the veins, but he taught that this communication is mainly accomplished through the medium of minute openings in the ventricular septum of the heart, through which he imagined small portions of the blood stream constantly to percolate. We know, indeed, that he used the word *anastomosis*, for Galen, as well as his predecessors of the Alexandrian school, believed that there is a further communication between the terminal branches of both veins and arteries. Galen asserted this communication without being able to prove it; indeed, he demonstrated that this communication plays an important part in the bleeding to death of an animal and the exhaustion of its veins, when an artery is opened; but in spite of the soundness of this conception he failed still to recognize the constant and inevitable flow of the circulation.

So we have seen, as Fleurens* points out, that before Galen's time there were three principal errors in the conceptions of the circulation:—the first, that the arteries contain air only; the second, that the ventricular septum is perforated; the third, that the veins as well as the arteries carry blood to the extremities. Galen corrected the the first error—the air error—but his false notions of the perforated septum and the functions of the veins remained an accepted doctrine until after the Revival of Learning.

Curiously interesting is the return to a discussion of the circulation in the early years of the Renaissance. One of the great followers of Galen was Mundinus of Luzzi, who taught anatomy at Bologna in 1315. He reiterated Galen's story of the circulation, and fixed it firmly in men's minds for more than three hundred years. In some sense he was our earliest modern comparative anatomist. Among other teachings he delivered himself of the following luminous

* P. Fleurens: A History of the Discovery of the Circulation of the Blood. 1859. p. 11.

statement :—Man is to be distinguished from animals because man has no tail,—"because being naturally erect he rests himself by the sitting posture, and a tail would interfere with his sitting down." *Hec sufficiant de anatomia totius.*

We must recall also the shrewd Da Carpi who lived two hundred years after Mundinus and followed closely his teachings. Da Carpi also taught anatomy at Bologna and distinguished himself by the astonishing discovery that men sometimes have been born with the *heart covered with hair.* On this account such men are braver than other peoples. In spite of this striking discovery, however, Da Carpi still clung tenaciously to the teachings of Galen.

Mundinus and Da Carpi were the early prophets of the Italian schools, but a greater than they was to arise while Da Carpi was still living. This was Andreas Vesalius, the famous surgical anatomist, a Belgian by birth, who was called to the Chair of Anatomy at Padua, in his twenty-third year. Vesalius is one of the most brilliant and attractive of our early heroes—the first great modern who refused to accept without demonstration the physiological teachings of Galen, although his work was done mainly in the anatomical theatre, and was concerned but indirectly with physiological problems. He came early to doubt those apocryphal perforations of the ventricular septum;—"I still do not see how even the smallest quantity of blood can be transfused through the substance of the septum from the right ventricle to the left."

This great writer offered no explanation of the transference of blood from veins to arteries, but evidently he was impressed with the unreality of the accepted teachings, and with the need of further study of the circulation. It is reasonable to suppose that his early retirement from teaching and his premature death postponed for a century the true explanation of the circulation.

Harvey, the distinguished English physiologist of the seven-

teenth century, is the man to whom we look as the discoverer of the circulation of the blood; and yet Harvey had an astonishing predecessor, Servetus, of whom too seldom we hear. Servetus asserted the arterio-venous anastomosis in the lungs. He was a fiery soul, a bumptious opponent, a polemical disputant, always at odds with the authorities, whether civil, medical or theological. He was a Spaniard, born in 1510, four years before Vesalius; and Calvin burned him up at Geneva when he was forty-three years old. Those were thorough-going days, and in this way the burning came about:—Though a physiologist, and anatomist, and a rebel against the Galenic teachings, Servetus was animated chiefly by a hatred of churchly dogma, whether of the old or new school. He used his own recently discovered physiological facts to overturn religious conceptions, and he wrote a book called "The Restitution of Christianity"—preaching a return to the primitive faith and life. He found that the Scriptures say the soul is in the blood, and that it gets into the blood through the air;—but, to do this, the blood must circulate through the lungs, which indeed it does, says he. The venous blood does not percolate through the ventricular septum, "but, by a grand device, the refined blood is driven from the right ventricle of the heart in a long course through the lungs. By the lungs it is prepared, assuming a bright color, and from the *vena arteriosa* it is transferred to the *arteria venosa*."

This was not the sum of his sinning, but at any rate the hardfisted old Swiss reformer seized him when he found him in Geneva; and burned him up, with his books. Two copies only of the *Restitutio* have survived, so far as I know,—one in the national Library in Paris, the other in the Imperial Royal Library in Vienna.

Various other commentators on the circulation lived in the time of Vesalius, but none, not even Vesalius himself, seems to have recognized the work or the existence of Ser-

vetus. Rialdo Columbus of Padua indeed reasserted, or rather, independently discovered the pulmonary circulation, and he denied vigorously the common belief in an open ventricular septum;—while Cæsalpinus of Pisa, towards the end of the sixteenth century, again described the complete flow of the blood through the lungs, and devised the word *circulation*.

Although the three writers I have named last, Servetus, Columbus and Cæsalpinus, asserted the fact of the pulmonary circulation, they asserted it from inferential reasoning, and not from demonstration; and mark this especially, that no one of them, save Cæsalpinus, had a word to say on the *general* circulation. Now Cæsalpinus in 1583 made this remarkable statement: Blood is conveyed to the heart by the veins; receives there its perfection; and this perfection being acquired it is carried by the arteries to all parts of the body.* It is hard to see how this can be any other than a clear assertion of a *general* circulation. Unfortunately Cæsalpinus's commentators do not seem to have grasped the significance of his surprising assertion, if we accept Fleurens, who brilliantly defended him some fifty years ago. Our own Dalton, writing in 1884, makes this astonishing comment on the work of Cæsalpinus:—"It must be evident that there is nothing in this passage which would imply in Cæsalpinus a knowledge of the general circulation." This is an old controversy, important only, perhaps, to the medical historian. For myself, I cannot but think that Cæsalpinus knew of what he wrote, and that we should take literally his writing.

We note one other name before coming down to Harvey himself,—Fabricius ab Aquapendente in 1574 took note of the valves of the veins, but failed to perceive their significance in assisting the flow of venous blood towards the heart. He supposed they served the purpose of little dams,

* Cæsalpinus: *De Plantis*. Florence, 1583, lib. ii, cap. II, p. 3.

constructed to oppose the too violent rush of venous blood from the heart to the extremities.

Then came Harvey, whose name marks the second period of interest in the history of the circulation. Three years ago Osler delivered the Harveian Oration on the *Growth of Truth*,—an oration so well known to us all that it is needless here to rehearse his collected facts of Harvey's life and career. Suffice it only to remind you that Harvey was in Italy at the end of the sixteenth century, when the medical atmosphere of the Italian universities was charged with the new interest in physiological studies, and that he was actually a pupil of Fabricius, the discoverer of the vein valves. As Fleurens says,—when Harvey appeared, everything relative to the circulation of the blood had been indicated or suspected; nothing had been established.

In the year 1616,—fourteen years after his return home, Harvey was made lecturer on Anatomy at the College of Physicians in London; and in 1628, twelve years later, he published the first edition of his great work—even to-day a wonderful volume, though it is but a little book. Dalton writes of it:—"This volume, a small quarto of seventy-two pages, undoubtedly contains a greater amount of important material in small compass than other medical work ever published." Here we recall the fact merely that he took up *seriatim*, the organs concerned with the circulation. He discussed the structure and action of the heart; the successive contractions of the auricles and ventricles; the passage of venous blood from the right auricle to the right ventricle and to the lungs; the passage of blood through the pulmonary vein to the left auricle, to the left ventricle and to the aorta. He observed the valves, membranes and *ostiola* which are found at the entrance of each of these passages. He traced the blood through the arteries, and showed that the arterial pulsation depends upon the pulsation of the heart. Then he passed to the veins, and from a study of

their valves drew the important deduction that venous blood can flow towards the heart only. He opened arteries in animals and perceived the rapid exhaustion of their blood, and their death from hemorrhage, from which he argued that the blood circulates throughout the body with great rapidity.

One important step in the circulation, however, was not clear to him—the movement of the blood from the arteries to the veins in both the general and the pulmonary circulation. He was convinced that in some way the blood does pass, and he conceived of a transudation through the parenchyma of organs,—a transudation, not through anatomical vessels, but through the structure of the tissues themselves. In this conception doubtless he followed the reasoning of Servetus, of Columbus, and of Cæsalpinus.

It remained for Anthony van Leeuwenhoek in 1688 to complete the story. Here is Leeuwenhoek's graphic description of his first sight of terminal anastomosis. He studied with his crude microscope the organs of tadpoles, and was able to observe the flow of blood through their terminal arteries and capillaries. In a letter to the Royal Society of London he exclaims with enthusiasm :—"Having seen this many times to my great satisfaction, I would not keep the knowledge to myself, but I showed it to five distinguished gentlemen, who told me that they had never seen anything deserving so much to be seen. We could not possibly have distinguished it, but as the blood consisted of a very clear liquid mixed with larger and smaller globules, so the observation of the circulation was the more distinct."

With the establishnent of an understanding of the circulation, there came about gradually a readjustment of the old conceptions of blood-vessel diseases and injuries, and of their treatment, while the significance of hemorrhage, grave as that significance had always been, became still more appalling. I fancy that the poets and prophets of old time

made even more mention of the blood than did many of the philosophers and physiologists. Vainly one searches the writings of Hippocrates for any word upon hemorrhage from wounds; and Celsus even, who wrote in the year 50 A.D., says merely that one must apply lint dressings and must tie vessels obviously bleeding.

Since the complete round of the circulation was not appreciated in the former days, the possibility of the body's emptying itself of blood was not apprehended. The fear of the old surgeons seems to have been merely that blood-vessels immediately adjoining the wound would become emptied. Doubtless it was through this misconception, and through recognition of the occasional value of bleeding, that the wide-spread practice of venesection* arose, which held bound conventional physicians for centuries, even after the actual discovery of the circulation.

The truth about the circulation of the blood had become acknowledged by all men at the beginning of the eighteenth century; but vital as was the truth, generations passed before surgical practice became modified. Indeed the work of John Hunter in demonstrating collateral anastomosis about an occluded artery, was needed to bring home to surgeons the significance of a constant blood-stream.

The history of the treatment of hemorrhage up to recent times can be summed up in three words:—*pressure*, *cautery*, and the *ligature;* yet one cannot study former writings without perceiving that these methods were not always satisfactory. The use of pressure went through many phases,—packing, tenting, handpressure, bandaging, acupressure; though strangely enough the tourniquet, the popular pressure instrument of to-day for controlling serious hemorrhage, was not satisfactorily developed until the time of Petit, in the middle of the eighteenth century.

* Henry I. Bowditch: Venesection; Proceedings of the Massachusetts Medical Society; 1871.

The old surgeons liked to employ pressure as a hemostatic. They found, if pressure was continued long enough, that it checked all forms of hemorrhage; and that hemorrhage, so checked, rarely broke out secondarily. The old surgeons did not understand the reason for this absence of secondary hemorrhage after the use of pressure, though we now know that the reason, as contrasted with ligature treatment, lies in the frequent elimination from the wound of sepsis-causing foreign bodies. A striking and original prsssure-method was that advocated in 1869 by James Y. Simpson in Great Britain,—the acupressure method. Simpson realized the disadvantage of ligatures, which in his time were left with long ends protruding from the wounds, that they might be pulled off when the artery had sloughed, and he devised the acupressure pin, an instrument resembling a hat-pin, which was passed in from the outside of the wound, and was made to compress the vessel for two or three days, or until the artery was completely blocked by natural processes. He then removed the pin, and in consequence left the wound free from external irritants. The familiar Wyeth pin used in hip and shoulder amputations is the acupressure pin of Simpson.

The cautery (the actual cautery) was needed to supplement the uses of pressure; and the story of the cautery wanders down through the history of surgery. If there were time it would be interesting to quote Paré and his opinion of this barbarous hemostatic. But Paré could not stop its use, and the cautery continued to torture patients, to destroy valuable tissues, ineffectually to check hemorrhage, to create horrible sloughing, and to comfort the surgeon's conscience for generations after Paré's time. Indeed, the use of the cautery in its various forms was regarded as a fine art down nearly to our own day.

The ligature is one of the ancient devices of surgery. The Alexandrians used it before the Christian era. Celsus

commended it. Galen established its value for the control of vessels wounded in continuity; and finally Paré, in the middle of the sixteenth century, re-introduced it on the battle-field as *the* hemostatic in amputations. The ligature was an improvement over the cautery and the equally barbarous boiling oil; but even so, the ligature was a constant source of danger, and an incentive to secondary hemorrhage until the introduction of the principles of Lister.

J. F. D. Jones, an English surgeon of 1810, writes:—"The records of our profession afford us few and detached observations on the suppression of hemorrhage, if we contrast the knowledge we possess with the importance of the subject." A hundred years ago Jones produced a valuable book on this matter—a book dealing with the dangers of hemorrhage, its treatment by drugs, the operation of the ligature, and the nature of the healing of arteries; and his treatise contains fifteen remarkable plates which demonstrate the character of arterial wound-healing. Jones discourses at interesting length on the studies of other men upon hemorrhage and the nature of hemorrhage; and with commendable accuracy describes the knowledge of hemorrhage and its treatment, as such knowledge existed in his time.

Such, as I have sketched them, were some of the measures used to combat active hemorrhage; but one finds also surgeons in all times endeavoring to correct the exhausting ill effects of hemorrhage after the flow of blood had ceased—the employment of after-treatment, as we call it. Indeed, such stimulating and upbuilding measures always have been familiar, rational and effective, so far as history or legend carry us. Rest and nourishment, repose and stimulation,—those for centuries were the means employed to bring back to health patients exhausted by hemorrhage. Freedom from apprehension, as well as freedom from pain, has always been recognized as supremely important. So we find Hippocrates and Celsus, Vesalius and Harvey, Paré and Wiseman pre-

scribing supporting food, and enjoining soothing medicines. Andrew Blake, a century ago, wrote:—"but opium is necessary * * * with the view of quieting tumult and where the pain is excessive."

Though such were the measures commonly used to check hemorrhage and to reinvigorate the body, wise surgeons and physiologists were appearing here and there, in ancient times even,—wise men who looked for still more prompt and effective measures for restoring the lost strength and the lost blood. Since loss of blood was seen to be the immediate and obvious cause of the loss of strength, we expect to find surgeons seeking to put back fresh blood into the exhausted tissues,—and, indeed, we do so find them.

All men know that our recent successful employment of *transfusion* is a revival and improvement of a former practice; but few men realize that the conception, if not the practice, of transfusion is nearly as old as medical literature. In the development of much modern surgical progress we are going over the old ground, and following the old steps in the same order as the ancients went and followed before us.

Modern surgery took up first the *investigation* and *treatment of gross and obvious lesions;*—compound fracture; abscesses, and inflammations from infection—such as appendicitis; and tumors, innocent and malignant, such as ovarian cysts, uterine myomata and breast cancers. Then surgery expanded to concern itself with *derangements of organs*,—ureteral obstruction, gall-bladder infections and pyloric stenosis. Next, in a burst of energy, it advanced upon the *more intimate seats of life;* it took up damage to nervous structures,—as brain tumors, and peripheral nerve lesions; and finally,—inspired and strengthened by recent teachings in physiology, it has succeeded actually in repairing damage to the heart, in mending diseased nerves, in joining severed blood-vessels, and in replacing amputated organs and limbs. In the midst of all this enterprise there has been involved

inevitably the question of *conserving the blood-stream.* While we are concerning ourselves with questions of *blood-vessel* surgery, we are not forgetting the *Blood.*

The surgery of ancient times developed along lines parallel to the lines I have just sketched,—and it reached many important conclusions and outposts. The thought, if not the practice of *transfusion*, was familiar to men of Virgil's time.

Oré,* the well-known French writer on Transfusion, has discovered many references to the ancient use of blood-transference. He finds that it was employed among the early Egyptians, in the armies of the Roman Republic, and by the Jews of Bible times; while it is mentioned by Pliny, Celsus, Ovid, Libavius, Fabricius ab Aquapendente, Harvey, and sundry others.

Many of the older essayists on the History of Transfusion speak of transfusion as though it was performed commonly; but indeed there is no good evidence that it was ever systematically and intelligently performed until after the middle of the seventeenth century. There is one rather amusing and striking anecdote always related among the early cases of transfusion—the case of Pope Innocent VIII, who died in the year that Columbus discovered America. Writers, following the text of Sismondi, used solemnly to assert that the notorious prelate, finding himself about to die, was persuaded by his Hebrew physician to submit to the transfusion of blood, according to the usage of certain practitioners, *although they had never tried it except on animals.* Accordingly three boys, about ten years of age, were bought, and their blood drawn. All three are said to have died at the beginning of the operation, "probably from air embolism." In spite of these heroic measures to save the pontiff, he himself died a few days later. If the story is true, this is the first well-recorded instance of transfusion. Unfortunately,

* Etudes sur la Transfusion du Sang: Par le Dr. Oré. Paris, 1868.

however, the critics have denied the anecdote; especially has Casse denied it,* who has written an entertaining monograph to prove the improbability of that old-time transfusion. Whatever the rights or wrongs of the tale, the fact remains that the thought of transfusion, especially as between animals, was familiar to the surgeons of the Renaissance.

On June 15th, 1667, nearly two hundred years after the lamentable demise of the three Italian boys, Jean Denys in Paris tried transfusion on man for the first time in French history. Although the experiment seems to have succeeded, the community was roused to an extraordinary pitch of excitement, and opposing factions were formed, these praising, and those abusing the novel undertaking. Finally, after a year, the civil authorities took the matter in hand and formally prohibited transfusion in human beings.

Almost at the same time, in 1668, during the reign of Charles II, the Englishmen, — Lower, King and Wren; the Italians,—Riba and Manfredi; and the Germans,—Kaufmann and Purmann, succeeded in transfusing blood from man to man. All of these experimenters used an extremely crude and dangerous method. They drew venous blood from the donor;—received it in a vessel;—and then poured it through a tube or catheter into a vein of the donee. The inevitable accidents happened; clots and air were introduced into the circulation of the sick; little benefit resulted, and an occasional death was reported. The operators became discouraged, and the community alarmed. The procedure fell into contempt. This outcome was a grievous disappointment to enthusiasts, for the thought of transfusing vigorous blood had aroused tremendous interest, and hysterical hopes; the sick were to be made well; the old were to be made young, and perpetual youth was to become the happy lot of all men. Shattered hopes were

* Une Page de l'Histoire de la Transfusion du Sang: par le Dr. J. Casse. Bruxelles, 1877.

not revived for many generations. Early in the nineteenth century, after nearly one hundred and fifty years, Blondell and Doubleday, the Englishmen, instituted again transfusion by a successful operation on a woman dying of post-partum hemorrhage. Recent interest in the procedure dates from that year, 1818, the beginning of the modern, or third period of Transfusion History, as Oré calls it.

Blondell was indeed experimenting in a field practically untrod; but he reached conclusions of striking importance, if only they might always have been proven true:—that the passage of blood through a syringe does not impair the blood's functions; that small quantities of air in the veins do not especially endanger the life of the patient; that blood transference from artery to vein is hazardous; and that human blood transferred to a dog may kill the latter. Two years later, Prévost and Dumas, after a series of experiments, were able to assert that immediate transfusion through a tube may properly be made from the artery of one animal to the vein of another.

The third transfusion period lasted for more than half a century. It covered the years from those early experiments of Blondell's to the time of the firm establishment of aseptic surgery,—that is, until about the year 1885. During this era a great deal of interest regarding transfusion was written and was said. Peet, in 1841; Soden, in 1852; and Higginson, in 1857, urged vigorously the value of transfusion, and discussed various methods of employing it. Especially Bischoff, in 1835, urged the value of defibrinating the blood drawn, and then injecting it by the indirect method; that is, by collecting it in a vessel, and then passing it through a tube into the patient, as contrasted with the direct method — the passage of blood from donor to recipient through a short intervening tube only.

Many surgeons were convinced that Bischoff's practice of using defibrinated blood marked a revolution in surgical

therapeutics, and his method was extensively tried throughout Europe. Numerous ingenious forms of apparatus were devised; one of the best perhaps being the funnel of Higginson, which was so constructed as to keep the blood warm in a hot-water chamber; while Brown-Sequard, in America in 1857, carried the process further by oxygenating the blood before injecting it.

In 1871, De Belina, in Paris, gave a further impetus to the use of transfusion by important studies and clinical demonstrations, and wrote these words:—"Not only do these cases show in an evitable manner the value of transfusion in post-hemorrhagic anemias, but also in asphyxia and eclampsia; and open a vast field to those future experimenters who shall profit by what has already been accomplished."

The discussion and enthusiastic work went on. Roussel of Geneva, in 1876, had become a recognized authority on transfusion. This earnest writer returned to the direct method and asserted that transfusing blood can mean only conducting without interruption and without contact with modifying agents, the living and unaltered blood, from one organism to another, so that it can produce all those vital effects which constitute the real rôle of the blood; and to this end a transfusing apparatus should be a direct anastomosis only from one vascular system to another. This illuminating statement gives us pause, and we think we have leaped at once to the latest modern method; but we find that Roussel did not look ahead so far. His direct anastomosis was through what he called an artificial heart. Today we should content ourselves with the more familiar name—Davidson syringe. He used what was in effect that familiar syringe, made of "pure unadulterated india-rubber," for which he claimed great virtues; and he pumped 200 grammes of blood from vein to vein in five minutes. Incidentally we learn from Roussel's article, that the governments of Belgium, Austria, and Russia had already at that

time (1876) furnished their army surgeons with a good transfuser, from which we are to suppose that he means his own transfuser.

All the writers in what I have called the third period of transfusion seem to have had a sound understanding of the physiology of the procedure. They recognized not only the value of fresh blood, *per se*, but the importance of fluid in bulk supplied to the exhausted circulation. Few of them, however, if we except Roussel, transfused large quantities of blood. For example, P. T. Morton, of the Pennsylvania Hospital, in 1874, writes of eleven ounces of blood as the largest amount that he had ever transfused, and his experience was considerable; while he states that he has known two ounces to stimulate the heart and save life when that life was on the verge of extinction.

All of the writers speak of the numerous conditions in which transfusion is of benefit:—for exhausting hemorrhage, whether from wounds, from childbirth, or from gastric and intestinal ulcer; for asphyxia of the new-born; in illuminating-gas poisoning; in chronic anemia, whether primary or secondary; in epilepsy; septicemia; uræmic poisoning,—and in all these and similar cases, they urge the performance of transfusion early—not waiting until the patient is at the point of death.

About thirty years ago, numerous experimenters began to advocate the employment of fluids other than human blood. So long ago as 1830,* Jœnichen at Moscow practiced and advocated intravenous saline infusions in cases of persons dying of asphyxia; while Roussel, in 1876, pointed out the propriety of employing the term *transfusion* to indicate blood-transference only,—*infusion*, to indicate the injection into the body of some substance other than blood. The suggestion of Jœnichen was adopted by numerous in-

* See paper by Rudolph Matas, *Intravenous Saline Infusion;* New Orleans Medical and Surgical Journal, July, 1891.

vestigators;—Schiff and Gaule demonstrated the value of saline infusions in cases of acute anemia; Bischoff, the same who advocated the employment of defibrinated blood, made a brilliant success with the injection of saline solution, an agent which numerons other experimenters down to our own time have shown to be of life-saving value.

In the early days of the use of saline infusions, and later, nearly up to twenty years ago, certain enthusiastic surgeons asserted, and with great show of reason, that salt solution was far preferable to blood as a vehicle of stimulation. In some sense and for obvious reasons, these assertions were true, for salt solution is readily obtained, and is safely employed. No physiologist, however, could admit any intrinsic superiority in salt solution over blood. Eighteen years ago, Matas expressed the situation correctly in saying that *mechanically* or *physically* saline infusions are the rivals or equivalents of blood infusions, while *physiologically*, salt solutions never can rival or equal blood.

It is extremely interesting to read in that early writing of Matas these words also:—"In speaking of blood as a medium for transfusion, we mean, of course, only pure, entire, living blood, and not the altered pathological material, known as defibrinated blood. We also mean blood of the same species, and not that derived from heterogeneous sources." This last statement, which suggests a knowledge of the hæmolyzing effects of blood of different species, had first been enunciated by Panum, writing in Virchow's *Archives* and quoted in 1871 by De Belina, who makes this interesting statement:—"The blood of animals can revive animals of different species, but only as a result of its passage. It decomposes at once, and if it has been injected in small amounts can be eliminated without causing disturbance; but if it has been injected in large amounts, it can cause death."

The convictions of Matas, expressed eighteen years ago,

as I have quoted them, are the convictions to-day of surgeons the world over. We all use saline infusions in cases of hemorrhage, after the bleeding has been checked, as well as for various other conditions of extremity. At times we supplement the simple saline by fortifying it with adrenalin, but our principal proposition maintains. We need to support by the bulk of the injection the vital or central avenues of the circulation, the blood-vessels in the trunk and in the brain.

The whole subject of the value of saline infusions in the treatment of hemorrhage is too familiar to need repetition here, especially in view of the elaborate work of Crile and Dolley, which they sum up in an admirable paper published three years ago.* These writers refer briefly and almost casually to two important facts regarding the use of saline infusions,—two facts which indicate the limits of its value, and mark off sharply its physiological action from that of transfused blood:—In the case of an anemic heart, there is always a possibility, or the probability even, that an intravenous infusion may precipitate an acute cardiac dilatation. When the pulse-wave is large, when the pulse resistance is slight, and its rhythm slow, we must use infusions with extreme caution. Crile and Dolley's second important point is this:—that the blood does not tolerate great dilution. Large amounts of salt solution pass quickly through the blood-vessels of the trunk, and accumulate in the lungs, the pleural cavity and the abdomen, with the result that the patient not only loses the benefit of the salt solution in his circulation, but may chance to find himself seriously embarrassed by abnormal accumulations of fluid in the trunk cavities.

One recalls also such fundamental facts as the importance of combining chemical with mechanical measures when dealing with those conditions for which infusions are given.

* G. W. Crile and D. H. Dolley, in Surgery, Gynecology and Obstetrics, July, 1906.

Hemorrhage is an important indication for saline infusions, and in the case of hemorrhage we employ morphia as well to secure rest; strychnia, cautiously, as a stimulant; posture, to aid in overcoming cerebral anemia; and bandages, artificial heat and the pneumatic suit.

Thirty and more years ago, surgeons were not satisfied that saline solution was the best agent to accomplish the benefits of which we now know it capable. They experimented with many other agents, and with apparent success;—with weak solutions of albumen, of bicarbonate of soda, of glycerin, and of milk. T. Gaillard Thomas, especially, in 1878, reported a series of remarkably interesting results from the infusion of milk,* and stated—a fact often forgotten—that this novel agent was first employed on men for infusions so long ago as 1850, by Edward M. Hodder of Toronto. Hodder had given as much as fourteen ounces of milk at a single injection; but Thomas convinced himself that eight ounces is the limit of safety. These experimenters and others found that absolutely fresh and sterile milk should be used, as decomposing milk quickly causes death. Thomas collected twelve cases of milk injection and wound up his paper with the following rather pathetic statement:—"I should be false to my own convictions if I did not predict for 'Intravenous Lacteal Injection' a brilliant and useful future." †

In spite of such freakish and bizarre experiments, the value of infusions of some sort continued to attract the confidence of the profession; but, by 1890, the saline infusion had taken its place as the one safe and available agent.

Saline infusions, however, have not always been given in

* The Intravenous Injection of Milk as a Substitute for the Transfusion of Blood: by T. Gaillard Thomas. New York Medical Journal, May, 1878.

† The history of milk injection can be traced back to the year 1667, when Johannes de Muralto of Zurich practiced the injection of milk into the vessels of one of the lower animals. Statement by August Schachner in the American Medical Practitioner and News, October 31, 1896.

the same manner. For example, Johnson-Alloway employed successfully in a case of desperate collapse from hemorrhage, the infusion of salt solution into the peritoneal cavity —injecting three quarts at a temperature of 110°, through a glass drainage tube into the abdominal cavity—when he found that this fluid was taken up rapidly by the exhausted circulation; while Dawbarn in 1892, and H. A. Kelly in 1894, advocated the injection of saline infusion directly into an artery. Dawbarn devised the technique of inserting a hypodermic needle into the femoral artery, and sending the infusion through the needle by the force of a Davidson syringe,—the fluid at a temperature of not less than 120°F. This writer maintained at the time, that two quarts at least should be injected. Kelly infused a litre of salt solution *centrally* into the radial artery of his patient, forcing the fluid towards the heart through a canula introduced into the artery. Both of these experimenters were satisfied of the value of arterial infusion, claiming for it a quicker action than when the solution was injected in the ordinary way into a vein.

H. T. Hanks of New York, writing in 1898, remarks: "Just how this simple salt solution acts in arteries may not be fully understood, but it is certain that the heart responds at once to the presence of the fluid. The cardiac and arterial ganglia are stimilated, whether the fluid is stimulating or not. . . . The additional fluid in the arteries certainly pushes on the half-stagnated capillary circulation, clearing out what would in a short time become semi-poisonous in itself. . . . The flushing out of the smallest blood-vessels by this diluted fluid is a virtue in itself."

Dawbarn makes this further note: —"I need hardly add here that *blood*-transfusion, either mediate or immediate, has now been dropped by almost all surgeons. When a person has bled to death, more than half the blood still remains in the body; and if this is properly increased in

bulk by any innocent fluid, this added bulk is all that the heart needs to make it resume work." Note Schachner of Louisville, who stated in 1896, that transfusion of blood proper, though regarded by different writers as both safe and unsafe, can no doubt in the hands of a careful operator be made free from danger. He remarks however:—"From the history of transfusion it is apparent that formerly its range of application was far more extensive than its merits justified." Schachner says further that the publication in 1891 of E. Schwartz "On the Value of Salt Infusion in Cases of Acute Anemia" established the modern confidence in salt infusion.

We see then that about the beginning of the present century surgical opinion had crystallized into the belief that blood infusions are hazardous, and that salt infusions are satisfactory and life-saving, because what is wanted is an increased intra-vascular pressure: that in some cases of alarming hemorrhage, infusion should be supplemented by transfusion with defibrinated blood; that the indications for infusion include any pathological state attended with a feeble pulse, and with shock; that the improvement of the circulation after infusion is due in part also to the stimulating influence which the hot salt solution has upon the heart, while at the same time "auto-infusion"—a forcing of the blood by bandages from the patient's extremities toward his centres—is an extremely useful manœuvre. Every surgeon of a few years' experience recollects that such conceptions were held to be sound, and such practices satisfactory, a very few years ago; and he knows that in most emergencies such measures will suffice.

Within the past ten years, with the additional light thrown upon the nature of shock and on the effects of hemorrhage—our conception of a paralyzed or of an exhausted vaso-motor centre—we have come to see that something more than the mere presence of salt solution in the blood-

vessels sometimes is necessary to restore a depleted circulation; while the observation that excessive amounts of saline solution in the vessels may paralyze an enfeebled heart, or may be exuded into the cavities of the trunk, has brought about successful attempts to return to a more rational employment of the long-neglected blood transfusions.

It is a fortunate and interesting fact that with this swing of the pendulum, with this turning back towards an endeavor to utilize the blood itself, a flood of new light has been shed recently upon the surgery of the blood-vessels. Our knowledge of the healing of veins and arteries has broadened, while at the same time we have learned the entirely novel fact that blood-vessels under proper conditions themselves may be repaired and anastomosed, so as to continue their normal functions. Taking advantage of this new knowledge, we have been enabled to make good the half-completed undertaking of Roussel, the Swiss investigator, who asserted more than thirty years ago, that true transfusion means the passage of sound or unaltered blood from the arterial system of the donor to the venous system of the donee.

We are now approaching so vast, so intricate, and so fascinating a theme, that one may not properly in a brief paper do more than suggest the lines upon which studies of the blood in surgery are developing. Less than two years ago, Stephen H. Watts of the Johns Hopkins Hospital collected in a luminous monograph a statement of accomplishments in blood-vessel surgery up to that time. Since then further progress has been made—progress srtikingly picturesque, if not more practically important. The list of laborers in this field is already great. Watts gave a bibliography of eighty-three numbers, and this bibliography to-day could be doubled. We in this country look especially to Abbe, J. B. Murphy, Carrel, Cuthrie, Matas, Dorrance and Crile for information on these matters. Indeed, there are many others, while the list of European investigators is a long one.

The first and most striking fact in *blood-vessel* healing, soundly demonstrated by these investigators, is the fact of the ready adhesion of intima to intima,—directly reversing the principle upon which the *intestinal* tube heals—serosa to serosa. For some time it seemed as though the necessity of applying intima to intima in small friable blood-vessels would oppose a serious obstacle to this branch of surgical research; but thanks to the sound demonstrations of Carrel and of Guthrie, we have now been furnished with a simple and reliable technique, which answers practical purposes. We have learned further that for the handling of blood-vessels special training is required, and the employment of special agents,—constant and proper lubricants; constant and unfailing warmth and moisture; delicately and accurately applied needles and suture materials. The surgeon who hastily and confidently undertakes any considerable work on the blood-vessels finds to his chagrin that the operation is anything but easy. We talk lightly of arterio-venous anastomosis, and of transfusion by the method of Carrel or of Crile; but the novice at such work will find himself floundering in clumsy perplexity, and will exhaust hours of strength and patience unless he has equipped himself for the task through painstaking and faithful experiments on animals, in the research laboratory.

For years Crile has taken the keen interest of a surgical physiologist in the nature and treatment of shock in hemorrhage. It was to be expected, therefore, that the development of blood-vessel surgery should suggest to him as to others the feasibility of practising blood transfusion by utilizing our recently acquired knowledge in this direction. In July, 1906, he published one of his most extensive articles on the treatment of shock and hemorrhage through the use of *saline* infusions. In November of the same year he published his first article on the "Direct Transfusion of

Blood in the Treatment of Hemorrhage." * On April 20, 1907, he demonstrated on a patient before the Society of Clinical Surgery his method of transfusing blood.

Already at that time others had become interested in this important work, and now some hundreds of cases have been collected. It is needless here to suggest the types of cases which are benefited by this operation further than to remind you that the transference of blood from donor to patient is not limited by any means to that class of cases which are commonly called surgical. The treatment will benefit a great variety of persons who suffer from a diminished quantity of blood, or from an inferior quality of blood. One sees, of course, the value of refilling a circulation exhausted by hemorrhage, but many observations teach us that something more than the mere bulk of the blood benefits the patient.

Many observers from Alexander Schmidt and Kohler to the investigators of our own time, especially Weil, Richet and Leary, have pointed out that certain properties in blood serum, artificially introduced, whether of animals or man, exercise a coagulating influence on the blood in cases of chronic hemorrhage. These observers have not been able to show, however, that the sera employed invariably act beneficially. On the other hand, small amounts of whole human blood transfused to a patient who suffers from repeated hemorrhages are sometimes found to shorten his coagulation-time as well as to check the habit of bleeding.

Last spring I had under my own care a patient who illustrated this fact:—a girl of twelve who had passed through her first three menstrual periods with alarming bleeding at each. At the time of her second period, on the advice of Leary, she was given 15 c.c. of rabbit serum, by hypodermic injection. Leary noticed that blood oozed afterwards from the needle punctures for half an hour. Two days later

* Journal American Medical Association, November 3, 1906.

the injection of serum was repeated, but was followed by no oozing from the needle punctures. The next monthly period was of the same character, and was treated successfully with guinea-pig serum. With the next, or fourth period, in May, 1908, she bled until nearly exsanguinated, when I was called to see her. She was in an alarming condition,—waxy, nearly pulseless, prostrated, after ten days of constant bleeding. I transfused to her from a vigorous young man, her cousin, about six ounces of blood. Her bleeding ceased immediately, and within three weeks she was well; but the notable fact in the case is that since last May, more than twelve months ago, she has had the normal catamenia of a girl of her age.

Internists, as well as surgeons, are coming to believe that the transference of blood is an important therapeutic measure. Its ultimate value is not yet determined, and the technique is still somewhat debated,—whether to use the direct suture of Carrel, or some mechanical device, such as that of Crile, of Ottenberg, or of Levin. At the same time that the therapeutic employment of transfusion is revived, doubts of its universal applicability are raised, through modern knowledge of the nature of the blood and the blood content. *Isoagglutination* and *hæmolysis* are terms which express conditions with which we must reckon.

By *isoagglutination* we mean the clumping of the blood corpuscles of one person by the serum of another, and this phenomenon may have an important bearing on blood transfusion, for isoagglutination suggests, as Hektoen pointed out two years ago,* that under special conditions homologous transfusion might prove dangerous by leading to erythrocytic agglutination within the vessels to which the blood was transfused. Hektoen suggests that this possible danger can be avoided by the selection of a donor whose corpuscles are not agglutinated by the serum of the recipient; and

* Journal American Medical Association, Vol. 48, p. 1739.

whose serum in turn does not agglutinate the corpuscles of the latter.

The condition *hæmolysis* raises quite another question,—a question the subject of much careful study during the past five years, and admirably summarized by Richard Weil in the Journal of Medical Research for October, 1908. Hæmolysis depends upon the fact that a red blood corpuscle is covered by a delicate membrane which is easily susceptible to change or destruction; and that when the membrane is damaged, the important contents of the corpuscle, notably the hæmoglobin, escape. This process is known as hæmolysis; and agents causing hæmolysis are termed hæmolysins. Among the organic hæmolysins are the blood and tissue juices of alien species, and notably the blood and tissue juices of the same species when subject to certain pathological conditions. For example, in pernicious anemia, in certain fevers, sometimes in chronic suppuration, and in certain cases of malignant tumors, there is such a change in the blood serum of the patient that his abnormal serum will hæmolyze the red blood corpuscles of a normal individual.

This phenomenon and the technique of such investigations are outside of further discussion in this paper, but the significance of hæmolysis must be apparent, and the importance of determining hæmolysis in cases subject to transfusion. Moreover the fact of hæmolysis may become, as we know, a suggestive factor in determining obscure diagnosis. Says Crile,* — "Our conclusion is that hæmolysis occurs in a number of diseases. It occurs in great frequency in cancer and tuberculosis. The reaction in tuberculosis is the reverse of that for cancer." †

In view of the struggles of our professional predecessors to establish, make available, and popularize blood transfu-

* Journal American Medical Association, December 12, 1908, p. 2038.

† Wyman Whittemore, working in the laboratory of the Massachusetts General Hospital, writes (Boston Medical and Surgical Journal, Jan. 21, 1909). From these results, at the present time, hæmolysis is of no value in the diagnosis of carcinoma.

sion, and in view of their ardor and their recurring failures, these facts regarding the nature of the constituents of the blood are extremely illuminating. Denys, Lower, Kaufmann, and their contemporaries failed successfully to establish transfusion, because they could not control clotting and air embolism. Blondell, Dumas, and their contemporaries in the last century failed to realize the danger of employing the blood of alien species; while Bischoff started the practice of defibrination, which for years led away his successors on a false trail. Brown-Séquard and his associates do not seem to have guessed even the intricate processes which mixed bloods may precipitate. The problem of transfusion is still by way of solution; the indications and the straight road are not always obvious.

Shall we believe that we shall soon be employing intelligently and effectively this great agent—transfusion—in a fashion perhaps to realize the dreams of the seventeenth century scientists looking to the close intertransference of individualized blood-streams; and the rebuilding of damaged tissue through the transference to the patient of a long-sustained normal current from a healthy donor?

Our ancestors looked to transfusion for rejuvenescence and perpetual youth; we, in a more modest generation, may look to transfusion for the reëstablishment of health in certain cases which hitherto we have often deemed hopeless.

ARTICLE XX.

THE SHATTUCK LECTURE.

THE WIDENING SPHERE OF MEDICINE.

By EDWARD W. TAYLOR, M.D.
OF BOSTON.

DELIVERED JUNE 15, 1909.

THE WIDENING SPHERE OF MEDICINE.

In accepting the honorable post of Shattuck Lecturer before this Society it was with no idea that I could adequately comply with that part of the provisions of the bequest which stipulates that the incumbent should discuss historically or otherwise the climate of this Commonwealth, or the diseases of its inhabitants. The foundation wisely allows a broader outlook over the field of medicine than would be possible under these rather limited conditions, in that other subjects are permitted, "such as," in the words of the bequest, "the said Society or its government may select." This permits me to draw your attention to certain matters of significance in the present condition of medical practice and medical education, which perhaps should be of special interest in this State which has long stood for progress in intellectual affairs.

My purpose, therefore, in what follows is to point out and attempt to estimate the significance of various well-defined tendencies in present day medicine. In such a consideration the following facts demand our attention:—first, the rapidly widening scope of medical theory and practice, with its new and unique opportunities; secondly, the apparent apathy on the part of men of promise and varied attainments to undertake medicine as a career; and finally the possible explanation of and remedy for this seemingly anomalous state of affairs. These are all questions which should claim the earnest attention of those who have the welfare of the profession at heart, and are viewing with interest and perhaps anxiety the curiously complex situation,

which is now presented alike to students, teachers and practitioners.

The beginning of a profession is difficult to define; it is commonly lost in myth and allegory, and becomes a definite factor in history only when a group of men so far impresses itself upon its contemporaries as to gain a definite hearing and prove the right of its ideas to continued existence. With few facts and much theory as a basis, such an infant profession must quickly assume a defensive attitude and be ready to meet the inevitable assaults of its detractors. The field is at first small, methods are naturally crude, empiricism prevails, a narrow point of view is encouraged if not cultivated. From such an origin the profession of medicine has grown to its present estate. Its vicissitudes have been many, and in its survival have descended the traits of its infancy and youth—its frequent narrowness of outlook, its strict adherence to an arbitrary ethical standard, its jealousy of outside influences and a sceptical attitude toward innovation of any sort. Though primarily concerned with other interests, the development of theology, for example, has been entirely similar. The crudities of the early years have given place slowly and grudgingly to the liberalizing tendency of recent investigations. If we are at times impatient of conservatism in medical matters it should not be forgotten that the strength of medicine as of theology lies in this spirit of intolerance to new ideas until they have demonstrated their worth. What has been accomplished for theology by the application of critical methods to the problems of interpretation has been done for medicine by the scientific revival of the last century, with its insistence upon demonstration as opposed to speculation. If the man of science has been slow to recognize the reality of other than material facts, it has been because the time was not yet ripe for the application of such knowledge, and certainly not because the scientific method was wrong and the speculative method right.

This is perhaps a fitting time to analyze in some measure the conditions which have led up to the present perplexing phase of medical theory and practice, and, laying aside the somewhat complacent attitude of satisfaction at things accomplished, to see wherein the profession is failing to meet in fullest degree its opportunities and responsibilities.

It is altogether superfluous to repeat the story of the discoveries which have rendered possible the relative success of modern medical and surgical practice. Ether, antisepsis, bacteriological research, and the triumphs of the scientific method in general have been the theme of too many addresses of this character to permit their further exploitation. These factors in progress are recognized and no added word before a gathering of medical men could fail to be superfluous. If we look rather at medicine as it is, we are forthwith impressed with its widening field, with the fact that whereas medical practice a few years ago was narrow and set about with definite restrictions, it is now broad, and acknowledges no limitation in its methods of alleviating human suffering, whether of the mind or the body. It now ministers to groups and classes as well as to individuals, or, in the popular parlance of the day, it has become preventive as well as curative in its ministrations.

In a recent notable address before the Æsculapian Club of Boston, former President C. W. Eliot, of Harvard University, drew forcible attention to his favorite theme of preventive medicine.* Out of his experience of forty years of close association with the problems connected with the teaching of medicine, he was able to say:

"I have seen an immense development of the natural forces and powers which can be applied in medical and surgical practice within the last fifty years, and the sight of the changes which have been has taught me that the changes

* Eliot. The Coming Change in the Medical Profession. Boston Med. and Surg. Jour., 1909. CLX, 184.

to come will be still more prodigious. There is not a single subject now taught in any good medical school of the world which is taught in any considerable degree as it was fifty years ago,—not one." And further on in the same address, after referring to the widening recognition of preventive medicine:

"Shall we not welcome the coming change? Is not the function of the medical profession, regarded as preventive, higher, better, happier than the function of the medical and surgical profession regarded as curative? 'An ounce of prevention is worth a pound of cure' in every possible sense, for the individual and for human society, and, therefore, we may believe for the medical profession of the future. It follows that medical education should take this direction strongly and decidedly. In all our educational institutions we should seek the prevention of evil."

The evident deduction from this strong statement of the coming change in the medical profession is that the need of the individual physician will grow constantly less, and that a comparison may be drawn between the physician who cures and the physician who prevents; or, as Mr. Eliot puts it in more general terms:—the function of the profession as preventive may be regarded as higher, better, happier, than its function as curative. This is a discouraging outlook for the men in the ranks, nor does there seem any adequate justification for so clearly defined a distinction as such a statement implies. It has often been said that the medical profession is the only one which consistently works to curtail its own means of livelihood by the prevention of disease through the existence of which its members might otherwise profit. This has always been done ungrudgingly and, if the signs are rightly read, will continue in increasing measure in the future, but are we justified in maintaining that such a function, unique as it is, has a moral quality which makes it higher or better than the

painstaking care and possible cure of the individual? In our enthusiasm for the progress of medicine along the most comprehensive paths, it is unfortunate at the present time to lose sight of the vast work which lies before the well-trained physician in his dealings with the individual patient. This time-honored personal relation may by no means be given a subordinate place from the moral standpoint, whatever the utilitarian aspects of the situation may be. Just here lies a danger in much of the discussion of the time. We are hearing so much on every hand of the prevention of disease, of the spectacular side of medicine, that there is decreasing incentive for men to undertake the humdrum life of mere practice. A feeling will inevitably develop, if, in fact, it is not already in existence, that to care for the individual is commonplace, that the devoted and often unrequited service of the practising physician will not gain the plaudits of the world, that honors are few for the practitioner who patiently works at his individual problem, and many for him who deals with the prevention of disease in its broader aspects. There should be no misunderstanding on this point. The function of preventive medicine is everywhere acknowledged. No honor can be too great for such benefactors as Reed, or Pasteur, or Flexner. The army of disinterested workers of which such men are representative must and surely will increase, and disease will just as surely be prevented to the lasting benefit of future generations; but however far-reaching their researches may be, our optimism cannot foresee the extermination of the conditions which make disease possible, and which will doubtless multiply in many unexpected ways with the coming years. Tuberculosis and cancer may conceivably disappear in the not distant future, but the problems of the individual are just as sure to increase with the development of urban life and the increasing complexities of so-called civilization. Is the profession or are the medical schools fulfilling their com-

plete duty if in their eagerness to advance the general problems of medicine they neglect to provide for the individual in fullest measure? Is it not apparent that false emphasis is already being laid upon certain aspects of a medical career? Can we evade the fact that the best men of our graduating classes do not seek the posts where they are most needed? Are the country towns being properly provided with men of highest capacity? Are not many men—recent graduates—wasting their time in a vain attempt to add to the sum total of human knowledge, by applying themselves to elusive research? The medical failures of a great city are the more pitiable because they might have been an ornament to their profession had they chosen or been led to choose wisely their sphere of usefulness. The leaders of the profession are in great measure responsible for the situation, and in no way more than in even distantly disparaging the dignity of simple medical practice. The very finest human relationships are those between individuals; such relationships have from earliest times had their best exemplification in the attitude of the physician toward his patient. This, at least, is one of the heritages of the past which under no circumstances should be lost. There never has been a time when the opportunity of the practising physician has been greater than now, and when there has been more need of the wise adviser in the purely confidential relation of man to man. There is a glaring fallacy in the idea that public lectures or popular treatises are adequate to meet individual needs. It is necessary in the present state of public opinion in medical matters that the dignity of the calling of the physician, as practitioner, be upheld, and by no means subordinated to any other function which medicine in its progress may assume.

In a recent volume entitled "An Alabama Student and other Biographical Essays,"* Professor Osler has rescued

*Osler. An Alabama Student, and other biographical Essays. Oxford University Press, American Branch. London. Henry Frowde. 1908.

from oblivion "A man," of whom he says, "you have never heard, whose name is not written on the scroll of fame, but one who heard the call and forsook all and followed his ideal" . . . . and further on in the essay on Dr. John Y. Bassett, who was the Alabama student, he says, "The saddest lament in Oliver Wendell Holmes's poems is for the voiceless,

for those who never sing,
But die with all their music in them.

The extracts which I have read show Dr. Bassett to have been a man of more than ordinary gifts, but he was among the voiceless of the profession. Nowadays environment, the opportunity for work, the skirts of happy chance, carry men to the summit. To those restless spirits who have had ambition without opportunities, and ideals not realizable in the world in which they move, the story of his life may be a solace."

Such a type of man as this Dr. Bassett, whom Osler found, is invaluable to the medical profession. By such men the bulk of the work of the world is done, and will continue to be done, in medicine as in other callings, however rarely they find so sympathetic a biographer.

It is not to be assumed from the foregoing abstract considerations that the individual practitioner has not felt and been deeply influenced by the widening medical outlook. No one influence has been more powerful than the extraordinary development of specialism, which, in fact, has been at the very root of all progress. The significance of this development is, I am convinced, commonly misunderstood. The opinion is abroad that specialism tends to narrowness; there is in some quarters a vigorous, and at times acrimonious, feeling that medical practice is suffering thereby; that perspective is being lost: that the patient is the victim of the narrow vision of the physician who has devoted his attention to one subject. Whatever measure of truth such

strictures may have, the more general practitioner should not fail to acknowledge his indebtedness to the work of the special students in the various departments of medicine. It is a platitude to say that progress in any branch of knowledge must come through specialization, and it is equally fatuous to argue that specialism is a misfortune, which must somehow be controlled and opposed. Whatever its evils may be, it cannot be checked except by the checking of all progress. Far more profitable that such an attitude is an effort to appreciate the broad significance of this fundamental modern movement, and to enquire wherein new adjustments must be made to meet the manifestly changed conditions. The charge often made against specialism that it is a narrowing tendency is an incomplete statement of fact. Its real significanee lies in its effort to solve problems. Its narrowness is therefore more than compensated by its depth. This tendency to go beneath the surface in the varied branches of knowledge constitutes the essential value of specialism however applied. The whole conception of medicine has been deepened by this movement toward the exact investigation of definite subjects, and we are now seeing the result in the increasing rationality of our views of disease and its treatment. It requires no prophetic vision to foresee that the various branches of medicine are destined to reunite at a deeper level, and on a more rational and coherent basis. On the practical side there is no evidence whatever that antagonism exists between those who term themselves "general practitioners" and those who term themselves "specialists." The general practitioner is dependent upon the knowledge which it is the work of the specialist to provide, and from the adequate coöperation of the two types of practitioners it is now true, as it always has been, and surely always will be, that the completest results for the alleviation of suffering will be secured. In the minds of many intelligent persons scientific medicine is

opposed to practical medicine, as if the kind of work rather than the attitude toward the work were the important factor. It is one of the signs of progress that this distinction is growing weaker, and that it is rather the spirit in which an investigation is undertaken than the character of the investigation itself, which determines its abstract scientific value. The practitioner in the most distant town should feel, as did Osler's Alabama student, that the dignity of his work depends wholly upon his attitude towards it, however grinding its drudgery may be. If such a practitioner cannot return to the exact ways of his forefathers, it is none the less possible for him to infuse into his practice the same enthusiasm and to maintain the same high ideals, on a basis far more substantial and of far greater value to the community which he serves. His field may not be so broad, for specialism is sure in time to permeate medical practice everywhere, but it is futile to say that the need of men of wide training and receptive mind will become less necessary to disseminate the knowledge which the laboratories and the specialists are providing.

Specialism, furthermore, as a principle of education cannot be evaded. Deep knowledge of any one subject is an invaluable intellectual asset, but this surely necessitates rather than precludes an increasingly wide knowledge of many subjects. The tendency therefore of specialism in its practical aspects is undoubtedly a broadening one—in that it shows the deeper relationship of otherwise apparently uncorrelated facts, and permits of generalizations which are the basis of all fundamental knowledge. Take, for example, so commonplace an instance as tuberculosis. Progress was slow and treatment futile, until the discovery of the tubercle bacillus made possible the deduction that tuberculosis was not merely a disease of the lungs accompanied by wasting, but an affection which manitested itself in the body wherever the tubercle bacillus might appear. Again, the

surgery of the central nervous system, which promises much for the future, has made progress only through highly specialized study of the nervous system and the organs of special sense; in other words, through a broad general understanding of the deep relationships of correlated functions and anatomical structures. The recent generalization of Cushing and Bordley relative to the significance of the color fields in the diagnosis of intracranial pressure, notably in tumor, is a specific example in point.

There can be no return to old and superficial methods. The deepening of special knowledge requires the conscientious application of its results, and this must ultimately be done by the rank and file of the profession—the workers in the active fields of general practice.

As a result of the varied activities and interests of the recent eventful years, the relations between the profession and the laity have been changed in a highly significant and far-reaching way. In the eyes of the laity the physician no longer stands on a pedestal of unreachable knowledge. The general scepticism of the time is demanding explanation of him, as of men in other walks of life, regarding his methods; his mere dictum no longer carries weight. His Latin prescriptions, if he still writes them, are doubtfully scrutinized; the patient more and more demands as his right to know what he is taking and why; he readily seeks other advice outside the regular profession if the expected benefit does not result from the treatment prescribed. The doctor of the present day shares the practice of medicine, as never before, with persons wholly without or with inadequate medical training. The public is frankly sceptical of many recognized medical methods, and demands an accounting. As a result of this challenge the medical profession stands at a parting of the ways. Will it proceed, fenced in by conventionality and the traditions of the past, or will it respond to the insistent demand of the times, and widen its

sphere of activity. The answer has already been given; the alternative squarely faced, with the result that the profession has entered upon a new phase of practical development and usefulness, the extent of which may as yet be but dimly foreseen. This widening of the sphere of medicine is no less significant than the scientific awakening of the past half century, which alone has rendered possible the new activities upon which we are now entering. We are witnessing the application to general practice in the broadest sense of the special knowledge gained through years of laborious research.

It is profitable at this point to consider briefly in what manner these changes have become manifest, in order that we may the better see wherein the opportunities of the future lie and wherein we may be failing in our medical schools to prepare the rising generation of physicians for this broad work.

Perhaps the chief benefit to medicine of scientific activity has been the gradual removal of mystery. A natural consequence of increasing knowledge is the substitution of fact for speculation, and this tendency medicine has felt in exceptional degree. The ordinary man now demands reasons, and not mere assertions for the physician's course of action. There is no longer anything sacred about the physician's calling in the sense that he has some mysterious power over natural processes. Explanation has largely taken the place of assertion, and accomplishes results where unsupported dogmatism signally fails. This natural consequence of the scientific revival is even now too often overlooked in our eagerness to reduce our work to a basis of exact fact. Science has established a naturalistic method, which demands a broad interpretation, unless a new and no less pernicious variety of dogmatism is to be substituted for the old. The profession is called upon as never before to look at all the facts, whether or not they fit into the category of those with

which medicine has hitherto been chiefly concerned. This the public rightly requires of us and it is eminently desirable that the demand should be met with dignity and with strict adherence to the principles of exact thinking upon which the future progress of the profession depends.

As a result of this changed attitude the public has become increasingly interested in medical affairs, as it has in religious and business and political affairs. With the growth of this public intelligence the aims and methods of the medical profession are being investigated and analyzed on every hand, as never before. The profession cannot, even if it would, longer stand aloof from the problems which it must share in common with other classes in the community. Herein lies the essential expansion to which it is my desire to call special attention. In a recent article in the *Atlantic Monthly* on "Democracy and the Expert," Mr. Joseph Lee* gives vigorous expression to the opinion that a new era is dawning not only in the history of medicine, but also in the history of democracy from the changing attitude of the expert toward the people. However extreme this statement may be, it is unquestionably true that to this demand the profession has of late generously, if not always wisely, responded through public lectures on the greatest variety of medical topics, through popular articles in magazines and the daily press, and through various attempted co-operations beween physicians and others of most diverse training. Some of these attempts have been reasonable, calm, and doubtless conducive to good; others have been ill-considered, and detrimental to true progress. They have all demonstrated the acceptance of the new responsibility upon which the profession is entering with extraordinary enthusiasm. The entering wedge in this significant movement undoubtedly has been the public campaign against tuberculosis. It is easy to recall the doubts of the conservative regarding

* Lee: Democracy and the Expert. Atlantic Monthly, 1908. CII, 611.

this method of public appeal, even in so wide-spread a menace as this. Such doubts have been completely allayed, and the public has so far justified its capacity to deal with this disease that Professor Osler is recently reported to have said that tuberculosis is no longer a medical problem, but one for the people. A recent tuberculosis exhibition in New York had an attendance of 750,000, and this experience, if not duplicated, has been approached in many smaller cities throughout the country. It is, however, wholly unsafe to argue from tuberculosis to other diseases of wide-spread fatality, regarding which our knowledge is vague and insecure. Simple hygienic measures, which a most limited intelligence can understand, are efficient in controlling tuberculosis, but the situation is very different regarding cancer and Bright's disease and arteriosclerosis and a host of other affections concerning the fundamental treatment of which we ourselves are in deep ignorance? A theory has been advanced that a little knowledge is better than none at all, and that the time has come to share such knowledge, however fragmentary, with the public. On this basis, it is maintained we should discuss diseases of all sorts freely and openly with the idea that some persons may be benefited and a measure of prophylaxis thereby be secured. With this as a principle I entirely dissent. It wholly ignores the great fact curiously neglected by the profession, that public suggestibility is a potent cause for the most distressing conditions and indirectly of disease. If we have a remedy which appeals to the popular mind and which we know to be efficient, no exploitation can be too active. This is the situation regarding tuberculosis. If we have no remedy, we should hesitate long before raising false hopes, and exciting vague fears. To alarm the people regarding the prevalence of cancer, to show its effect to a morbidly interested public, when we know nothing of its cause, is a questionable policy. I say this with no lack of conviction

that early operation is the one established means of cure, a matter which each individual physician should unfailingly insist upon; but in the present state of our knowledge we are paying too dearly in anxiety and causeless worry to urge a public discussion of this great subject. Here is an instance where the responsibility of the individual physician is great and the present responsibility of the public lecturer small. Again, pneumonia is a highly fatal disease, but why discuss it in public when we know practically nothing of its prevention or cure? The situation is analogous to that of an engineer who has not yet solved the problem of the building of a certain bridge. The public is vitally concerned in the results of his work, but certainly not in the means of its solution, which is peculiarly the engineer's function, for which he has been trained and for which the public holds him responsible. The medical profession is in the same situation. It also has its practical problems to solve and the public is vitally interested in the results. Disease in itself is neither an interesting nor a profitable subject for contemplation. Popular interest begins when results become apparent, by which the welfare of the public is subserved. Until such results are forthcoming public interest avails nothing in the solution of the problem, and mere public fear and curiosity are very potent possibilities of harm. Medical lectures have become exceedingly popular within a few years. They are largely attended by audiences of varied type. Such lectures have been given in New York, Baltimore, and Boston, and they will and certainly should be continued, with increasing possibilities of usefulness. But to this end the topics should be chosen with care and constant reference to the real needs of the public; the result should be to remove misapprehension and allay unnecessary fear, rather than to excite morbidity, and exploit half-knowledge. A safe guide might be to inform the public only of those matters of which we have definite knowledge

ourselves, and which are of manifest value in the general campaign against disease. Lectures which are thus discriminating must surely be a potent influence in the education of the public and constitute one of the broadest possibilities in the future expansion of medicine.

Another form in which the profession has responded to popular interest is by books, of which Walton's "Why Worry" is an admirable example, and by less elaborate magazine articles on the greatest variety of medical topics.* The danger into which the lecturer is likely to fall is largely obviated by this method of presenting to the public medical facts in popular and useful form. They are apt to be written with circumspection and certainly constitute within limits a perfectly legitimate method of extending medical knowledge. It is a striking sign of the changed point of view that not many years ago any popular exposition of medicine by a physician was looked upon as a doubtful procedure, indicative of personal self-interest. This narrow state of mind is happily past, and we may well look for the development of a useful, if small, number of physicians who have the capacity and inclination to widen the scope of medicine by this means.

The coöperation of the public is evidently essential in the larger work now immediately before the profession, not only in actually assisting in the combat against disease, but also in furthering the work of research through endowment and other financial support. Events of recent years have demonstrated the fact that such coöperation already exists in large measure, and is likely to be even more generous in the future. The social consciousness in medical matters needs to be developed to the highest degree, and here again lies a function of the medical profession, the importance of which can hardly be over-rated.

* Recently the *Boston Evening Transcript*, under the caption "The Clinic," has published weekly a series of articles on diversified medical topics, edited with care and discretion.

Within the ranks of the profession itself the ways in which the field of medicine is widening are almost bewildering in their diversity and possibilities of usefulness. The development of what has been termed "social service" is one of the most significant. Under the leadership of Dr. R. C. Cabot, beginning some years ago at the Massachusetts General Hospital and since adopted at a number of institutions in Boston, notably by Dr. W. R. Woodbury at the Boston Dispensary, and elsewhere, departments have been formed for the purpose of studying the underlying causes of disease and maladjustments and the social problems connected therewith, through the agency of trained workers under medical direction. In this effort to meet the fullest demands of medical treatment, the problem is offered by the individual patient and from him extends in ways as yet but partially defined to the society of which he happens to form a part. It is difficult to prophesy the regions into which this new activity of the medical profession will lead, but it cannot be questioned that it is offering peculiar opportunities to persons of special capacity which are as yet but dimly realized. Hygiene and preventive medicine have also been slow of recognition; opportunities for the education of men for this field of work have hitherto been inadequate, as Mr. Eliot has recently pointed out, and yet such men are needed everywhere and in increasing numbers. The extension of modern medical methods into benighted regions and countries, the study of tropical disease, the work of the army and navy, the training of men for public service of most varied character, are all fields of endeavor, which our medical schools have been far too slow in recognizing as an integral part of their legitimate province.

In still more fundamental ways than these a new responsibility demanded by public opinion is forcing itself upon the attention of the medical profession. Some twenty

years ago I remember hearing a distinguished medical teacher say that the moral welfare of a patient was no concern of the physician; that his dealings were alone with the welfare of the body. There may be some who are still of this opinion, but I take it that the more thoughtful members of the profession are recognizing that this is but a half-statement of the physician's duty. Perhaps the most fundamental lack in the medical profession at the present time is the failure to realize in a broad way that from the practical standpoint it is futile to hope that a chain of physical causation may be found for manifold ills of the mind. Ten years ago Dr. James J. Putnam,* in a striking lecture under this foundation, with a no less happy title, "Not the Disease only, but also the Man," drew forcible attention to the röle of the physician as an educator, and to the necessity of a comprehensive study of the mental side of the patient in the same spirit of exact enquiry demanded by the facts of the so-called physical world. If we could as a profession bring ourselves to appreciate that a fact is no less real because it happens to be immaterial, we should forthwith have opened the door to a wide possibility of usefulness. There is no more interesting phenomenon than that apparently natural antagonism of the ordinary man to facts which transcend the testimony of his physical senses. Pain, except as personally experienced, has no such reality to him as the physical state which accompanies it. Grief or anxiety or apprehension are to the ordinary medical mind less worthy subjects of rigid examination and study than the manifold disorders of the body, however trivial they may be. The general physician has simply not concerned himself with that great field of investigation which lies between physical ailments on the one hand and the manifest disorders of the

* Putnam: Not the Disease only, but also the Man. Shattuck Lecture, 1899. *Boston Med. and Surg. Jour.* 1899, cxli, 53. See also, Harrington, Annual Oration, Massachusetts Medical Society, 1908. *Boston Med. and Surg. Jour.* 1908, clix, 31.

mind, which we speak of as the insanities, on the other. It is, however, increasingly apparent that in this region, the border-land between health and disease, lies the largest opportunity for the expansion of medical practice in the years to come. Recent experience has abundantly shown the wisdom of conservatism in the prosecution of research in this field. It must be remembered that nowhere in the diversified branches of medical practice must so many problems relating to the broader life of the individual in the family, in the community and in society at large, be wisely met as in a consideration of the mental perturbations of sane individuals who seek medical advice, and who form a large contingent of every physician's practice. One often hears the reproach expressed, both within and without the profession, that medicine has signally failed in this field of endeavor, and that irregular practitioners of varied sort have invaded this territory which rightly belongs to the medical profession. It should be remembered in this connection, as before implied, that the conservatism of medicine constitutes its highest claim to public recognition, and also that when the definite usefulness of a procedure is established it will always receive a cordial recognition. The fact that the approach to certain great problems has not been made from the mental side is because the special students of the subject have failed hitherto to impress their convictions upon the profession at large, and certainly not because the profession is unwilling to receive new light, if there be any. What knowledge we have in this field has come from the laborious work of medical investigation. In spite of the inevitable set-back due to ill-considered public exploitation the movement toward a recognition of the principle that mental maladies demand mental treatment has consistently gained in influence; in this there will be no backward step. Those of us who view with enthusiasm the outlook in this direction cannot but feel that here again lies an opportunity of which little avail has yet been made.

How are we meeting this rapidly developing responsibility? Are we sufficiently realizing that dependence upon vague generalities, comprised in such terms as encouragement, imagination, the personality of the physician, and other inadequate expressions of similar character, are a detriment rather than a help toward the elucidation of the problems immediately before us? Are we giving our medical students in a systematic way the benefit of the knowledge, slight though it be, hitherto attained? Are we yet willing to admit that a knowledge of mental processes in the treatment of abnormal states of the mind and, secondarily, of the body, is an essential element in a broad therapeutic conception? These questions may with justice be answered in the negative. There is, however, no doubt that the study of the mental life in a spirit of exact enquiry has found a permanent and honorable place in the profession among a few investigators. It is equally evident that the profession at large has as yet taken no active interest in this significant movement, and that its results have therefore not permeated medical practice to any appreciable extent. It is a hopeful sign that the profession is no longer antagonistic; that its attitude is increasingly receptive; that it is asking for information and demanding methods of applying the knowledge gained, which, as in all other departments of research, it becomes the function of special students of the subject to supply. The responsibility of the medical schools in this field certainly cannot much longer be evaded or postponed.

In this connection it is a source of gratification that the ultimate medical science—Psychiatry—has finally received a recognition in this country, long since accorded it in Europe. In no other department of medicine has prejudice been so evident both without and within the profession as in the study and care of the mentally diseased. The application of modern psychological methods to these subtlest

of all human problems, the introduction of the pathological laboratory into the hospitals, and the conception of psychiatry as the most inclusive of the sciences connected with medicine, has opened the way to a field of research, the limits of which may be but dimly foreseen. It is an astonishing fact that the prophets of medical accomplishment find small place in their dreams of the future for the prophylaxis of mental disorder. The extermination of the physical scourges of the human race, the infective fevers, tuberculosis, cancer, are the subjects—and very rightly—of eloquent statement from many sources, but may we doubt that when all these have yielded to the advance of knowledge, there will still be left a vast work for men trained as few have yet been, in the prevention of the greatest of all human menaces? Can we doubt that our work has but just begun in dealing in a comprehensive spirit with the underlying causes of mental vagary, upon which must ultimately depend the sources not only of personal, but of civic, instability? We have recently witnessed a determined and successful attempt on the part of citizens and even of certain physicians to prevent the location of a hospital for the comprehensive study of mental disease in the immediate vicinity of the medical schools of this city, where manifestly it would be of greatest service. Deeply discouraging as such an attitude of prejudice may be, it is gratifying that the general plan is not likely to fail,* and that Massachusetts is about to take its place as a pioneer in the adequate study and classification of mental disorders, as it has in many other departments of wide public utility. In spite of the unusual difficulties placed in its way, it is not to be doubted that this branch of medicine is entering upon a period of active development, which promises much for the future, nor can it be questioned that under the leadership of such men as Meyer

* Since this was written the Massachusetts Legislature has appropriated $600,000 for this Psychopathic Hospital, and Dr. Owen Copp has been appointed its superintendent.

in Baltimore, Hoch in New York, Barrett in Michigan, and Southard in Massachusetts, investigation leading to discovery will be forthcoming.

If the foregoing statement of facts be accepted, it is evident that medicine has entered upon an expansion impossible in any profession of less broad human interest. On the one hand, it has developed not one but many sciences in the interest of human welfare, and, on the other, it is applying its results in continually widening fields. The public has come to demand of the medical profession not only that it solve the problem which the laboratory sets, but also that it fit men for service to the individual, to the state in the interests of public health, and to social service in its most varied aspects. Furthermore, the profession of the future must concern itself with the mental life of the individual and of the community as never before, if it is to meet its fullest privileges and responsibilities. Whatever other interpretation may be put upon these facts, it will not be denied that the medical profession is now offering unusual opportunities of usefulness to men of the most varied attainments. And yet we still hear of the overcrowding of the profession, the hard and difficult way of the practitioner, and the precariousness of a livelihood under existing conditions.

The anomalousness of the situation is the more apparent, when over against the manifestly increasing opportunities in medicine, the fact is faced that our better medical schools not only are not increasing their enrollment, but in not a few instances are actually losing students. Here is a definite cause for anxiety. The demand is greater than the supply, and certainly so unusual a state of affairs requires explanation. Where does the difficulty lie which makes such a condition possible, and where may a remedy be sought? The fault must lie, first, with the undergraduate training of prospective physicians; and, secondly, with the attitude of the undergraduates themselves. We have heard

much of late years of the raising of standards. There has been extraordinary divergence of opinion as to the degree and kind of training a person should have before undertaking his medical course. Some of the schools, with questionable enthusiasm, have regarded that uncertain sign of scholarship, the A.B. degree, as a fitting badge of attainment. Others, of greater conservatism, have been less arbitrary, but still have demanded a standard of admission to medical study, which in a different way has been hardly less open to criticism. It has been a somewhat universal feeling that the study of medicine demands a peculiar type of mind,—that minds may be classified into medical or legal or theological varieties,—that a man's destiny is predetermined by certain so-called natural mental qualities. We hear that the physician is a naturalist, that to be successful he must be apt in the natural sciences, whatever his attainments in the broader fields of life may be. Our medical schools, now that they have begun to take any interest in the matter at all, have done everything possible to encourage this attitude. Realizing the doubtful validity of the A.B. degree as a badge of special scholarship, they have advised, if not prescribed, certain preliminary studies—chemistry, biology, physics, French, German—as a necessary preparation for medicine. Much effort has been spent in determining the amount and character of this preliminary study, with the result that the real problem at issue is further from solution than ever. In the altogether laudable and necessary attempt to raise the standard of scholarship, the mistake has been made that it has been proportionately narrowed. Whereas medicine in actual practice has been expanding in most varied directions, as has already been pointed out, the medical schools have been closing their doors to men of capacity on the arbitrary assumption that only certain men of definite mental types are fit for its study. Whatever drawbacks the Bachelor's degree may have,

it certainly indicates a possible wide diversity of interests, and as such is not exposed to the charge of narrowness, but the schools have advised, if not required, the holder of a Bachelor's degree to present certain special evidences of fitness for medical study. In other words, even the degree is not wholly sufficient. Whatever compromise may be reached, and this does not concern us at this time, the fact is definite that the raising of the standard of admission to medical schools has resulted in its narrowing. Whatever may be said to the contrary, the character of medical preparation, whether before or in the medical school, has not kept pace with the extraordinary expansion in the possible work of the graduated physician. The result is natural and inevitable. Schools of low standard continue to flourish. Schools of high standard are not beginning to supply the real demand of the time for men trained and enthusiastic for pioneer work in the widening sphere of medicine. The beaten paths of practice still no doubt are overcrowded. The surgical and medical ranks are full; the average student of medicine follows the path of least resistance with alacrity, and often with disaster. Is it not a function of the medical school to see the importance of, to make attractive, and to point the way to other paths, deserted, if not wholly untried? The present false emphasis placed on certain branches, encouraged by the schools and naturally fostered in the students, is certainly detrimental to the even development of medicine in the direction of public demand. The attitude of the student is almost inevitably that of his teachers. He is led to believe during his undergraduate days in an academic department or in the professional school that medicine is a circumscribed profession, much more so than law, for example, and that once entered upon it, the path is narrow which leads to success. As President A. Lawrence Lowell, of Harvard University, has recently said, nothing is done to interest the student while still in college

in the diversified possibilities of his future professional work. He has heard much of surgery, which he presumably aspires particularly to practice; he knows little and has no means of hearing of the many public fields of usefulness into which he might enter through the portals of the medical school. In this respect, medicine is still far from being a liberal profession and a recognized means of acquiring a broad general culture. The profession at large is rising to a clear recognition of its widening responsibilities in the broadest social and even political relationships. The medical schools are still bound by the traditions of medical education as it was thirty years ago.

However wide the disagreement may be with this statement of the present situation, the simple fact cannot be questioned that our higher standard schools, in spite of an equipment not dreamed of a few years ago, are not attracting sufficient students to meet the requirements of the medical demands which lie immediately beyond their doors. In the feverish anxiety to train men adequately for certain well-defined and essential branches of medical work, the broader possibilities of medical education have been strangely overlooked. A readjustment is necessary, together with a clearer emphasis on the diversified needs of the people whom the profession serves.

In what direction may we look for such a readjustment, for a remedy for the present anomalous situation? It certainly cannot be by a lowering of the standard acquired to the lasting benefit of medical education during the past twenty years; nor does it depend upon whether a Bachelor's degree or some other form of attainment is required for entrance to the schools. The principle lies deeper in the clear recognition that any raising of standard hereafter must be accompanied by a coincident broadening of that standard. Under no circumstances should such an elevation of standard be associated with its narrowing, as has heretofore been a

distinct tendency. Insistence has increasingly been laid upon the necessity, for example, of biology and chemistry as a preparation for medical study, but what of psychology, sociology, and the great group of allied sciences which stand in the most intimate possible relation to the later work of the physician? Is it surprising that young men of special aptitude in other than the conventional fields turn away from medicine when they are confronted with such a reception as this? Can we hope to develop the type of medical men the world is demanding if we attempt to cast them all in one mold? Are not our medical schools bound to recognize the broader outlook and to admit to their degrees men of varied attainments and most diversified interests? This would entail no lowering of standard, but rather a liberal attempt to meet a legitimate demand at present not satisfied. Under no circumstances should men of unquestioned capacity be excluded merely because they may fail to conform to a preconceived and narrow standard. The pendulum has swung far in the direction of so-called scientific research with acknowledged results of the most far-reaching value to the cause of medicine. The very success of such a movement is likely to develop intolerance, and the intolerance of the man of science is peculiarly difficult to meet. There is at times danger that we may lose sight of the utilitarian function of the medical school. Its service is ultimately practical, whatever the means to that end may be, and if the number of its students is to be maintained and increased, it must be so conducted as to meet the fullest requirements of the community for which it exists. In the pursuance of this object there are strong indications that the curious development of education which has rendered possible four years of freedom of choice in the academic course and four years of essentially prescribed study in the professional school will give place to a reversal, or at least to a modification, of these conditions in the years to come. It is not to be doubted

that the wasteful method of demanding a detailed course in surgery, for example, from the prospective internist, or of obstetrics from the future bacteriologist, will give place to a more rational conception of the use of time. An elective system,* modified to meet the special demands of the situation, is an inevitable outcome of the present state of affairs, if our medical schools are to be the centres of educational activity which their equipment justifies.

It must not be presumed that I am unmindful of the extraordinary progress which has been made in medical education during the recently past years, nor of the very great difficulties which the medical schools are facing through the changing aspects of medical practice. To preserve a due conservatism and at the same time to meet the requirements of an exacting public demand is a task of the utmost delicacy. In the attempted accomplishment of this task, it is increasingly desirable that no false emphasis be laid upon any one branch of medicine and that the development of medical teaching keep pace with the expansion of medical research in its diversified branches. To this end it is necessary that the practice of medicine in its time-honored aspects be not subordinated to other more comprehensive interests; that investigation and the growing field of preventive medicine be given fullest scope; that the special branches both of practical and theoretical medicine be accorded an increasing degree of consideration at the hands of the medical schools and the hospitals; that the great social problems in which medicine is destined to play an important part be considered a worthy subject of undergraduate attention. The immediate need of the future is to emphasize the wide possibilities of a useful career in medicine in many new directions as well as in the old and stereotyped ways, to inspire interest and to encourage special aptitude toward ac-

* At the Harvard Medical School the fourth year of study has been elective for several years.

complishment in the new and untried paths which are everywhere opening. To accomplish this ideal our medical schools must adopt a broad as well as a high standard and must clearly recognize the fact that in the future medicine will unquestionably offer careers of usefulness and honor to many men seemingly unfit, if judged by the present narrow requirements.

ARTICLE XXI.

THE RESPONSIBILITY OF THE GENERAL PRACTITIONER FOR FREEDOM OF MEDICAL RESEARCH.

By W. B. CANNON, M.D.
OF CAMBRIDGE.

READ JUNE 16, 1909.

THE RESPONSIBILITY OF THE GENERAL PRACTITIONER FOR FREEDOM OF MEDICAL RESEARCH.

I FIND myself in the unenviable position of a person pointing out to men, whose lives are filled with work of great variety, a new responsibility. Fortunately, however, this responsibility is one which does not require more than an interest in the methods of medical progress and a desire to further medical progress in every proper way. It is therefore a responsibility which active practitioners of medicine may take upon themselves without any considerable additional demand on their time or their energies.

At a recent large meeting of medical men Dr. Charles W. Eliot urged the necessity of coöperative work among the members of the medical profession, and pointed out two important problems inviting such coöperation. One of these was the combatting of new forms of superstition which are tending to confound vague fancies with the hard-earned results of careful investigation in fields of medical science; the other was the refuting of the ill-founded and unreasonable assertions which have been directed against animal experimentation. It is to this second proposition that I desire to call your attention.

The need for meeting the opposition to medical research is manifest when we consider what that opposition has already done and what it still aims to do. Through agitation by the opponents of animal experimentation there was passed in England in 1876 a legislative act placing upon medical investigators certain well-defined restrictions. Concerning these restrictions Huxley wrote as follows :—

"So it comes about that, in this year of grace 1877, two persons may be charged with cruelty to animals. One has impaled a frog, and suffered the creature to writhe about in that condition for hours; the other has pained the animal no more than one of us would be pained by tying strings round his fingers and keeping him in the position of a hydropathic patient. The first offender says, 'I did it because I find fishing very amusing,' and the magistrate bids him depart in peace—nay, probably wishes him good sport. The second pleads, 'I wanted to impress a scientific truth with a distinctness attainable in no other way on the minds of my scholars,' and the magistrate fines him five pounds."

"I cannot but think," Huxley added, "that this is an anomalous and not wholly creditable state of things."

The English Act has now been enforced for 33 years, during which time it has in some instances seriously interfered with medical research. Work of the first importance has been stopped in England, and Englishmen have been compelled to go abroad in order to carry on investigations of great practical value. I need only mention the names of Lord Lister and Sir Lauder Brunton as instances of medical men whose investigations have been hindered through the English Act.

The English Act requires that all experimental work on animals shall be done in specified places and shall be subjected to scrutiny by government inspectors. These inspectors have recently reported that during the entire period of inspection they have failed to find any instance of cruelty in the conduct of animal experimentation in Great Britain.

In spite of the enforcement of such drastic legislation as was obtained in England in 1876, there has not been the slightest diminution in agitation against animal experimentation—indeed, England may be regarded as the centre of this agitation. There are no less than 15 antivivisection societies in England, and every one of them stands for

the abolition of the use of animals in medical investigation. The English experience is, therefore, highly significant as to the probable future of this agitation. Just as our forefathers had to carry on the long struggle which has resulted in the legalized use of human bodies for medical and surgical instruction, so are we concerned with a similar long struggle for freedom of medical investigation.

In England, about a year and a half ago, a society was formed for instructing the public regarding the methods used in animal experimentation, and regarding the practical results to medicine and surgery that have been derived from this method of medical advance. Already in England it is believed that an important change in the attitude of the public has been obtained through this educational campaign.

It may seem to those of you who have not followed the agitation in this country that there is only a remote possibility of any hostile legislation being enacted which would seriously interfere with medical progress. This sense of security is, I believe, to a large extent unjustifiable. At least four active antivivisection societies now exist in this country; one of them publishes a monthly paper, while the others confine themselves to distributing literature. This literature is in the form of pamphlets and leaflets and press articles which are sent widely to newspapers in parts of the country where proposals for legislation are being urged. At least two of the societies are well supplied with money; indeed one of them received this year through the will of a Massachusetts woman $10,000.00 for antivivisection agitation. Evidently so long as money is readily available for the promotion of a hostile attitude toward animal experimentation we shall have the problem of meeting that agitation. Unless we meet it properly the hostility and misunderstanding which these societies promote will doubtless grow until there is a preponderance of sentiment against the medical investigators, and then the legislative bodies in

the various states will feel called upon to interfere with the laboratory procedures.

The conviction has grown in this country, as in England, that the proper method of meeting the attacks of persons opposed to animal experimentation is to enlighten the public regarding the use of animals for purposes of medical advancement and regarding the benefits to man's estate that have come from that use. With this conviction as a basis there was appointed last year by the American Medical Association a Council on the Defense of Medical Research. This Council is composed of representatives of various medical sciences, who live in well separated parts of the country. During the past year the Council has been actively investigating the conditions of animal experimentation in laboratories throughout the United States, has taken precautions against the abuse of animal experimentation and against misconceptions of the conditions and purposes of medical research, and has planned a series of papers by experts which will serve to diffuse information regarding laboratory procedures and the results of laboratory study of disease. Some of the information which has been secured by the Council I desire to present to you.

In order to learn the conditions of medical research a circular was sent to all of the most prominent schools. Reports have been returned from more than 80 of these schools. It is stated on high authority that in not more than three of the schools that have not reported are animals used for experimental purposes. The information that has been accumulated is therefore quite complete.

In this circular questions were asked as to the approximate number of different kinds of animals used per year; the methods of securing these animals; the number of dogs and cats killed in the city merely to dispose of the excess; the care of animals in the medical school, including the ventilation, warmth, cleanliness and lighting of their rooms;

whether operations likely to involve pain were always performed under anæsthesia; whether students were permitted to carry on independent investigation or were cautioned against it; whether experimental work was conducted under rules; and whether any public hostility to animal experimentation existed in the community. These questions have been fully answered.

It may interest you to know that in a large number of laboratories dogs and cats are secured from the city pound or the city police, and that in some schools owners contribute animals to be destroyed. In one instance animals are reported as being obtained from officers of the humane society who had investigated the laboratories and had become convinced that the animals are humanely treated.

The accommodations for experimental animals are reported as being well lighted, well ventilated, properly warmed and clean; in many instances special animal houses have been built, and in five instances a special attendant is provided to care for the rooms and their occupants.

In answer to the question whether any cutting operations on unanæsthetized animals are performed, all the schools that use animals have reported "no" with, in a few instances, one or two slight qualifications such, for example, as cutting the vein in a rabbit's ear to obtain blood for hæmolytic work. Of course this operation was most common in general medical practice on human beings 75 or 100 years ago.

The number of schools in which animals are kept alive after operation are very few. From these schools the testimony is uniform that hospital after-care is always given to avoid discomfort.

There is absolutely uniform testimony that students are supervised in any work which they do on animals, and, in fact, are not permitted to perform any experiments, except in a few of the laboratories, on any animals other than frogs.

In a majority of the schools students receive explanations of the importance of animal experimentation and their responsibility to medical research and public health in not performing experiments without supervision, a practice which might result in harmful legislation. In other schools this precaution has not been taken because regarded as superfluous.

The experimental animals whose service in medical research rouses the greatest amount of hostile sentiment are the cat and the dog. The investigation conducted by the Council reveals the fact that the majority of the dogs used in medical schools are used in courses in surgery for teaching surgical technique. Subtracting the number of dogs thus used from the total number leaves relatively few dogs and cats that are employed for purposes of research. Compared with the number of these animals that are destroyed in various cities of the country, the sacrifice of their lives in laboratories is almost insignificant. Figures have been obtained from about 20 cities, but in many of these the number of cats killed was not reported. In one year there is a record of more than 360,000 dogs and cats being killed in these cities merely to be rid of the excess. In New York city alone during the past fourteen years more than 800,000 cats and more than 400,000 dogs have been thus destroyed. In one year in New York city there are put to death more than ten times the number of dogs and cats that are used for all purposes in all the laboratories in all the medical schools of the country. In the face of these figures it is ridiculous to speak of the "waste" of animal life in the laboratories of medical research. Surely the animals that go to their death with no benefit save that which comes through reducing their number, have their lives "wasted" much more than the animals that are killed in the laboratories in order to increase the body of our knowledge.

The contention may be made, however, that the destruc-

tion of animals in the public pound is humane, whereas the use of animals in laboratories is attended by suffering and deep distress. It is urged by those who are little acquainted with the conditions in laboratories that the experience of animals at the hands of experimenters is in all respects horrifying. Indeed the assumption is commonly made that experiments are performed only behind locked doors and that an attempt to learn the truth regarding the dark insinuations as to the nature of the orgies performed in these secret torture chambers would be futile. It is further assumed that those engaged in animal experimentation protest against any sort of regulation of their activities. Indeed the medical investigators have been accused of contending that it is no one's business what happens to an animal so long as the individual who is handling it can plead that his aim is to increase science. These assumptions and insinuations are not supported by an investigation of the actual conditions of research.

The Council on the Defense of Medical Research has learned that in the larger medical laboratories regulations have been posted, in some instances for many years, stating the conditions and expressing the spirit in which animal experimentation was to be conducted. These regulations have been collected, summarized and revised, and have been sent to all laboratories which have reported that animal experimentation was carried on within their walls. These rules are as follows :—

I. Vagrant dogs and cats brought to this Laboratory and purchased here shall be held at least as long as at the city pound, and shall be returned to their owners if claimed and identified.

II. Animals in the Laboratory shall receive every consideration for their bodily comfort; they shall be kindly treated, properly fed, and their surroundings kept in the best possible sanitary condition.

III. No operations on animals shall be made except

with the sanction of the Director of the Laboratory, who holds himself responsible for the importance of the problems studied and for the propriety of the procedures used in the solution of these problems.

IV. In any operation likely to cause greater discomfort than that attending anesthetization, the animal shall first be rendered incapable of perceiving pain and shall be maintained in that condition until the operation is ended.

Exceptions to this rule will be made by the Director alone, and then only when anesthesia would defeat the object of the experiment. In such cases an anesthetic shall be used so far as possible, and may be discontinued only so long as is absolutely essential for the necessary observations.

V. At the conclusion of the experiment the animal shall be killed painlessly.

Exceptions to this rule will be made only when continuance of the animal's life is necessary to determine the result of the experiment. In that case, the same aseptic precautions shall be observed during the operation, and so far as possible the same care shall be taken to minimize discomforts during the convalescence as in a hospital for human beings.

By the adoption of these rules in a number of new places and by the enforcement of similar rules in the older medical schools, the laboratories in which animal experimentation is conducted on a large scale may be said to be regulated by this form of government. Within the coming year these regulations will probably be enforced in all the medical laboratories in the United States. It is the conviction of members of the Council that the regulations probably do not change in any respect the already good conditions under which animal experimentation is carried on; they do indicate, however, to new-comers in the laboratories and to interested and intelligent people, the intent of the investigators and the precautions which they take against suffering.

In spite of the fact that the evidence points to a satisfactory condition of animal experimentation in this country,

and in spite of the enforcement of the foregoing regulations in the medical laboratories, there is likely to be continued agitation for legislative interference. What objection is there to such legislation?

The first objection that may be fairly raised is that there is no demonstrated need for the government of laboratory procedures by specific law. So long as the contentions of those opposed to animal experimentation are merely vague suppositions based upon possibilities of carelessness, and are without specific instances of the abuse of animals, it would be reprehensible to burden the statute books with unnecessary legislation.

Another objection to specific law controlling animal experimentation is that it is class legislation. The legislative function of the State is to enact general laws against cruelty to animals. Specific legislation would place scientific men under a peculiar surveillance and limitation. This is unnecessary. The general laws regarding cruelty are quite adequate to cover the cases of infliction of unwarranted pain, no matter by whom inflicted. Only last fall, in a veterinary school, a professor was convicted of cruelty on this basis; whether justly or not is not pertinent to the present discussion, the fact is that the existing law was adequate. Similarly two students of "optometry" in New York were convicted under the general law which provides for punishment for causing in animals "unjustifiable physical pain, suffering or death." It is wise to demand, therefore, that the general laws against cruelty be applied before passing special class legislation.

The third objection to specific legislation is that such legislation merely serves as an entering wedge for securing more stringent laws later. In the *Journal of Zoöphily*, March, 1909, is found the following statement: "We believe that in the course of time we shall have total abolition of vivisection, but as we cannot get it now, we think we

may be justified in asking for something that will help the poor animals a little. Though we may not get abolition at once, we shall eventually." This is the attitude everywhere taken by the moving spirits among the opponents of animal experimentation. As I have already pointed out, England has had a restrictive law, with registration of buildings, reports of experiments, and laboratory inspection, for 33 years, and yet there is no country in which the attack on animal experimentation is more relentless. The passage of specific law would, therefore, not allay agitation. In this connection it is well to note that no other civilized country has followed England's lead; no English dependency has done what the mother country has done! As Sir Michael Foster declared with reference to the English Act, "England offers, in this respect at least, an example to be shunned alike by her offspring and by her fellows."

With reference to specific legislation the question is frequently asked, "What objection is there to government supervision and inspection?" To my mind there would be no definite objection to thorough inspection by *competent* persons. To inspect banks, experts in banking are appointed; to inspect laboratories, experts in experimentation should be specified. Such experts, however, are not satisfactory to those who are opposed to the use of animals for research. They desire their own representatives to act in this capacity. Nothing is more evident, however, in antivivisection literature than the gross errors of judgment which are made by ignorant persons incapable of interpreting scientific description, yet just such persons are intent on securing the right to inspect laboratories and pass judgment on the procedures which they witness.

A further objection to inspectors is that which has been brought out in the course of the recent inquiry in England regarding the working of the English Act. Antivivisectionists have declared that they would not believe an inves-

tigator under oath, and that they would not trust laboratory procedures to be carried on humanely unless an inspector were continuously in the laboratory during all the operations. The impossibility of providing for this amount of inspection seems to me to necessitate a certain amount of reliance on the good-will and natural humanity of those who are engaged in animal experimentation. The person to whom the community can look for the control of conditions in the laboratories and to whom the responsibility for those conditions can be most strongly presented, is the director. The director, furthermore, is much more likely to be continuously at hand during work in his department than any outsider. For these reasons I feel convinced that the regulations regarding animals stated above, which place upon the director the responsibility to public interest, is a wise and common-sense solution of the problem of control.

The third activity of the Council on the Defense of Medical Research, aside from investigating the conditions of animal experimentation and taking precautions against its abuse, has been the diffusion of information as to laboratory procedures, and as to the results of investigating disease through laboratory methods. The present paper is an instance of this third class of activities, for I have been informing you of some of the facts coming from the enquiry into the conditions of medical research in this country. Other papers, however, are to be published during the coming year—papers which are to be written by experts and which will deal with the importance of animal experimentation in the development of various phases of medical science and practice. This series of papers will include a consideration of the relations of animal experimentation to our knowledge of the principles of serum therapy, diphtheria and tetanus, meningitis, rabies, small pox, dysentery and cholera and typhoid fever, plague, tuberculosis, syphilis, tropical protozoan diseases, diseases caused by metazoan parasites, dis-

turbances of internal secretions, the physiology of the circulation, pharmacology, venoms and antivenins, two papers on experimental surgery—surgical technique and aseptic surgery, cancer research, hygiene and sanitary science, including the diagnosis and control of contagious diseases, the economic importance of diseases which have been lessened by animal experimentation, the use of animals in cattle bureaus, the experience of animals in laboratories, the ethics of animal experimentation, the educational value of operations on animals, and the more complex inter-relations of research and practice.

The above series of papers will probably be reprinted in book form or as pamphlets, and either placed on sale or distributed in regions where agitation is active. The purpose of gathering this large body of evidence regarding the conditions of animal experimentation, and the results that have been derived from it, is to place before physicians facts with which they can meet criticisms directed against the laboratories and the laboratory workers.

And here I wish to speak again of the new responsibility I mentioned at the beginning. As I there stated, the responsibility is one that involves merely an interest in the methods of medical progress and the desire to further medical progress in every proper way. The literature to be accumulated will show how the facts used daily in medical and surgical practice have had their origin in experimentation. This literature will also make clear the manner in which abolition of animal experimentation, or serious interference with it, will definitely check or disastrously retard the progress of medicine in fields where there is urgent demand for more exact knowledge. Those who are doing their utmost to hamper the activities of medical investigators are sending broadcast literature only too often quite inaccurate and misleading. Nevertheless the statements of these agitators are regarded as fair statements of the pro-

cedures which attend medical investigation, and these agitators are making converts to their point of view because their activities are not met by corresponding activities on the part of medical men, and their statements are not contradicted by the information which medical men are in a position to offer. In some respects, unfortunately, laboratory workers are unable to meet these attacks with convincing power. One reason for this is that these workers are not naturally engaged in public affairs, but are primarily students. Furthermore, even when they do speak their motives are questioned,—they are declared to be under the necessity of advocating the practice which provides them with a livelihood. The only persons who are in a strong strategic position to defend research and preserve to it that freedom which is necessary for the unrestricted advance of our knowledge of disease and its control, are you, the practising physicians and surgeons. You are in a position through your special training to speak with authority concerning the benefits derived from animal experimentation, for you are employing information, thus derived, in the daily treatment of the sick. You are also in a position to know the methods employed in medical laboratories to advance our knowledge of disease. On the other hand you meet in the course of your duties persons whose feelings have been harrowed by the tales of torture that the antivivisectionists put forth, persons of humane temper seeking for the facts. The laboratory workers must depend upon you to be interpreters of their work and the spirit in which that work is performed.

ARTICLE XXII.

THE POST-MORTEM DIAGNOSIS, PREVALENCE AND PREVENTION OF RABIES.

By LANGDON FROTHINGHAM, M.D.V.
OF BOSTON.

READ JUNE 16, 1909.

THE POST-MORTEM DIAGNOSIS, PREVALENCE AND PREVENTION OF RABIES.

Rabies is one of those diseases which destroys life without causing any gross anatomical pathological lesions which can be considered pathognomonic. There is but one condition in the dog which must be looked upon with much suspicion, and that is the presence of divers foreign bodies in the stomach; but this occurs in only a small percentage of cases, and, even when found, is not sufficient evidence to warrant a final expression of opinion. An autopsy, therefore, can only be of limited assistance to us in the diagnosis of rabies, and one must seek other more accurate methods.

POST-MORTEM DIAGNOSIS.

The oldest and until recently the only accurate method has been the inoculation of animals, and this must still be frequently employed. The animals used for this purpose are rabbits or guinea-pigs. The material to be inoculated consists of an emulsion or suspension made by grinding portions of the brain or spinal cord in sterile water, bouillon or glycerine. A few drops of this fluid are injected under the dura or directly into the brain. It is astonishing how much can be introduced in this manner without the animals showing the slightest inconvenience; having recovered from the ether, they continue eating as before, and remain well; only when such material contains the virus of rabies do they show the characteristic symptoms of this disease. Such symptoms may be evident as early as the seventh day, but rarely; usually not until between the sixteenth and thirtieth day, and occasionally not for three months or even longer. This is a long time to be kept in suspense if one

has been bitten by a supposed rabid dog, and for many years more rapid and equally accurate means of diagnosis have been sought.

In 1903 an Italian observer named Negri discovered certain inclusions in the nerve cells of the brain and cord of animals and people who had died of rabies; he considered these protozoa and the cause of this disease. These inclusions are now known as Negri bodies; and, although they may not be the specific cause of rabies and their exact nature is not yet established, their presence is certainly diagnostic of the disease; as diagnostic for rabies as the tubercle bacillus is for tuberculosis, and with the same exceptions. For example, one may not be able to demonstrate tubercle bacilli microscopically in a given tubercular material, but, if some of this material is inoculated into a susceptible animal, it becomes tuberculous. Similarly with rabies, one may not be able to demonstrate Negri bodies with the microscope in all cases, but inoculations prove positive. After many experiments by numerous investigators it is now considered quite unnecessary to inoculate animals for diagnostic purposes if these bodies have been discovered.

Negri bodies occur with the greatest frequency and in the greatest abundance in the Ammon's horn (hippocampus major), next in the cerebellum. We, therefore, seek for them in these regions first. There are numerous methods by which they may be clearly brought out. The section method, the only one at first known, consumes much time and necessitates much labor, although the peculiar arrangement of the cells of the Ammon's horn and the distribution of the bodies in these cells lessens the labor of the microscopic examination and the time expended therein. I have, therefore, found my impression preparations* of the Am-

* *Journal of Medical Research*, 1906. "The Rapid Diagnosis of Rabies."—Langdon Frothingham.

Zeitschrift für Tiermedizin, 1907. "Zur Schnellen Darstellung Der Negrischen Körperchen."—Langdon Frothingham.

American Journ. of Public Hygiene, 1908. "Impression Preparations and the Van Gieson stain for Negri Bodies."—Langdon Frothingham.

mon's horn, and also of the cerebellum, of the greatest assistance inasmuch as they are excellent substitutes for sections, especially those made from the hippocampus, in which maximum accuracy is combined with minimum expenditure of time and labor. (Demonstration by lantern slides of sections, impression preparations and Negri bodies.)

There is still another means of diagnosis, and one which often proves of great value when Negri bodies cannot be found or inoculations cannot be made, for it not infrequently happens that a dog's brain has been completely blown away by shooting with a shotgun at close range, or that a brain is so decomposed that it cannot be used either for microscopic examination or inoculation.

In such instances we may examine the nerve ganglia with profit. Any ganglion will suffice, such as the posterior root, plexiform or Gasserian. The lesions here found are usually very marked and characteristic. They consist of a multiplication of cells within the capsule of the ganglion cell, the ganglion cell itself becoming gradually destroyed and its place being finally occupied by the invading cells, thus forming a focus suggestive of a tubercle. Such lesions may be very extensive, involving most of the ganglion, or only a few ganglion cells may be attacked in this, the typical form. Another, the atypical form, consists of a more or less general infiltration of cells without such characteristic grouping, though usually, and especially when the lesions are extensive, the two forms exist together. Such lesions are not pathognomonic of rabies, for they rarely occur in other disorders, but from the study of more than seven hundred Gasserian ganglia from animals—mostly dogs—I find the percentage of error is very small, and I feel that one is justified in making a diagnosis by this means when others fail. (Lantern slides illustrating the lesions.)

To sum up, then, I adhere to the following rules in examining every case which is sent to me for diagnosis:

1. Seek for Negri bodies in impression preparations of Ammon's horn, cerebellum and cortex. If not found, sections are later studied as a control, and, I may add here, always with the same results as the impressions.

If bodies are found, no further study is necessary.

2. If bodies are not found, the Gasserian ganglia are examined for lesions, and, when possible, animals are inoculated, whether the ganglia are positive or not.

Thus you can see that a diagnosis is made only after careful study fully in accord with modern scientific methods; there is no jumping at conclusions.

PREVALENCE.

We now come to the prevalence of rabies. In Massachusetts, vital statistics in animals were not kept until recently, but we know that there must have been an outbreak of rabies between the years 1876 and 1882, for during that period forty-four people died of this disease. Again between 1888 and 1894 there was another outbreak, for during this period forty-five Massachusetts people died of rabies.

In 1895, vital statistics regarding rabies began to be recorded, and the following tables, made up, or copied directly from the reports of the Cattle Commission (now called Cattle Bureau), and from my own records, show with the usual degree of accuracy the amount of rabies we have had in Massachusetts for the past dozen years. The figures do not exaggerate matters, for undoubtedly numerous cases of rabies, as well as many suspected cases, were never reported. Some of the tables are reproduced from the reports, in order to give you some idea of this branch of the Cattle Bureau's work, and that you may note numerous interesting details regarding this disease, such as its distribution throughout the State, kind and number of animals affected and quarantined, period of incubation after inoculation, etc.

RABIES IN MASSACHUSETTS.

—1895.—

DOGS REPORTED TO CATTLE COMMISSION.

Date.	*Town.*	*No. of Cases.*	
Oct. 15.	Newton.	1	
Nov. 23.	"	1	(Inoculations + Dr. Ernst).
Dec. 20.	Millbury.	1	
" 30.	Watertown.	1	(Ran from Revere).

—1896.—

Inoculation for Rabies.

DESCRIPTION OF RABID ANIMALS.	Town	Rabbits Inoculated.	Rabies, First Symptom.	Days Elapsed.
		1896.	1896.	
C. C. 432, Newfoundland dog, (*a*)	Waltham, . .	Jan. 6,	Jan. 20,	14
455, poodle, ...	Revere, . .	Jan. 21,	Feb. 4,	15
489, setter, ...	Hardwick, .	Feb. 21,	Mar. 11,	19
494, black and tan, . .	Chelsea, . .	Feb. 29,	Mar. 15,	15
— —	Haverhill, . .	Mar. 1,	Mar. 15,	14
503, collie, ...	Lowell, . .	Mar. 14,	June 11,	89
509, spaniel, ...	Salem, . .	Mar. 18,	April 2,	15
spaniel, ...	Boston, . .	April 1,	July 1,	91
532, dog, ...	Cambridge, .	May 16,	June 26,	41
horse, ...	Haverhill, . .	April 14,	June 19,	63
545, dog, ...	Lynnfield, . .	June 12,	July 7,	25
565, cat, ...	Cambridge, .	July 23,	Aug. 1,	7
611, whippet, . . .	South Hadley, .	Nov. 9,	Nov. 23,	14
631, mongrel, . . .	South Hadley, .	Nov. 27,	—	—
632, pug, ...	Haverhill, . .	Dec. 3,	—	—
dog, ...	Boston, . .	Dec. 18,	—	—

You will note in this table that, as usual, most of the cases of rabies occur in the dog, and that they are not more frequent in the warm months than in the cold, in fact less so in this instance. Note also the extraordinary difference in the period of incubation after sub-dural inoculation, varying from seven to ninety-one days. From a dog bite the period

is sometimes as long as five to eight months in the bitten animal, and exceptionally fifteen to twenty months. Instances of two year periods have been reported, but may be open to criticism.

The inoculations recorded in the above table were mostly made by Dr. W. F. Whitney, who kindly permitted me to assist him from time to time.

—1897.—

The following table shows the number of cases reported during the year, either rabid, or suspected of being so :—

MONTH.	City or Town.	Animal.	Number of Cases.
January,	Boston,	Dog,	3
January,	Holyoke,	Dog,	2
January,	Waltham,	Dog,	2
February,	Holyoke,	Dog,	3
March,	Holyoke,	Dog,	1
May,	Lynn,	Dog,	1
July,	Boston,	Dog,	2
July,	Lynn,	Dog,	1
August,	Holyoke,	Dog,	1
August,	South Hadley,	Cow,	2
September,	South Hadley,	Cow,	5
November,	Sudbury,	Dog,	1
November,	Melrose,	Dog,	1
November,	South Hadley,	Cow,	1
December,	Wakefield,	Dog,	1
Total number of cases reported,			27

Laboratory Report (Frothingham).

Positive.	*Negative.*	*Doubtful.*
8	3	1

In this and the following laboratory reports the number of cases marked "doubtful" means that at the time the report was made the laboratory work was still uncompleted, or there was no proof that the case was or was not one of rabies; either the brain was so decomposed that it could not be used to obtain further evidence, or inoculated animals were still under observation.

—1898.—

MONTH.	Town.	Species of Animal.	Result of Rabbit Test.	Remarks.
January, .	Braintree, .	Dog, .	Positive (Dr. Frothingham).	
January, .	Lynn, . .	Dog, .	Positive (Dr. Frothingham).	
January, .	Lynn, . .	Dog, .	Positive (Dr. Frothingham),	Bit a man, a boy and five dogs.
January, .	Salem, . .	Dog, .	Positive (at Pasteur Institute, New York).	Bit a man, who went to Pasteur Institute; and a mare, that died of rabies. Four dogs were quarantined by local inspector for ninety days, but none of them have ever developed rabies, and may not have been bitten.
January. .	Swampscott,	Dog, .	No test made, ...	Shot as supposed case of rabies.
January, .	Melrose, .	Dog, .	Positive (Dr. Frothingham).	
January, .	Lynn, . .	Dog, .	No test made, ...	Killed as supposed case of rabies.
January, .	Salem, . .	Mare, .	Positive (Dr. Frothingham),	Bitten by a dog, as given above.
February, .	Lynn, . .	Dog, .	Positive (Dr. Frothingham),	Reported to have bitten owner and several dogs.
February, .	Salem, . .	Dog, .	No test made, ...	Killed by order of board of health.
February, .	Danvers, .	Dog, .	No test made, ...	Head when it arrived too decomposed to use.
February, .	Lynn, . .	Dog, .	No test made, ...	Killed as rabid by dog officer.
February, .	Lynn, . .	Dog, .	No test made, ...	Killed as rabid by dog officer.
March, .	Swampscott,	Dog, .	Positive (Dr. Frothingham),	Came from Ocean Street, Lynn. One dog bitten by him shot, eleven other dogs near by quarantined ninety days, then released.
March, .	Lynn, . .	Dog, .	No test made, ...	Killed as rabid by dog officer.
March, .	Lynn, . .	Dog, .	Positive (Dr. Frothingham).	
March, .	Lynn, . .	Dog, .	Positive (Dr. Frothingham).	
March, .	Lynn, . .	Dog. .	Negative (Dr. Frothingham),	Killed as supposed rabies by dog officer.

— 1898, *continued.* —

MONTH.	Town.	Species of Animal.	Result of Rabbit Test.	Remarks.
April,	Watertown,	Dog,	Positive (Dr. Frothingham),	Killed by policeman after biting a child.
April,	Haverhill,	Dog,	Negative (Dr. Frothingham),	Killed by member of board of health.
June,	Lynn,	Dog,	Positive (Dr. W. F. Whitney, for Lynn Board of Health).	Came from Swampscott. Reported to have bitten several people and dogs. Two dogs quarantined for 90 days were released, having shown no symptoms of rabies.
July,	Lynn,	Dog,	— —	Killed by member of board of health.
September,	Lynn,	Dog,	— —	Quarantined by inspector as tuberculous, probably chronic bronchitis.
September,	Lynn,	Dog,	— —	Was not a case of rabies, but viciousness. Killed by consent of owner.
September,	Boston,	Dog,	— —	Killed as case of rabies by inspector of animals.
September,	Newton,	Dog,	— —	Reported as rabid. Bit three people and several dogs. Twelve dogs in the neighborhood were quarantined, two have since been killed by their owners to avoid danger, and two have died of rabies. Eight are still in quarantine.
October,	Newton,	Dog,	Positive (Dr. F. W. Whitney, for Newton Board of Health).	Bitten by dog, as reported above.
October,	Newton,	Dog,	Positive (Dr. Frothingham),	Bitten by dog, as reported above.
October,	Lynn,	Dog,	Negative (Dr. Frothingham),	Bit several people and dogs. Three dogs are still in quarantine as a matter of precaution.
October,	Quincy,	Cat,	Positive (Dr. Frothingham),	Bit two or three persons.
October,	Boston,	Dog,	Positive (Dr. Frothingham).	
October,	Boston,	Brown rat.	Negative (Dr. Frothingham),	Bit a woman.
October,	Dracut,	Dog,	Positive (Dr. Frothingham),	Bit a man; injury slight.
November,	Lowell,	Dog,	Positive (Dr. Frothingham).	
December,	Boston,	Dog,	— —	Reported as case of rabies by inspector of animals.

—1899.—

LABORATORY REPORT (Frothingham).

Date.	*Town.*	*Animal.*	*Result of Inoculation.*
Jan. 16.	Ipswich.	Cow.	Positive.
" "	Melrose.	Cat.	0
Feb. 7.	Swampscott.	Dog.	0
Mar. 22.	Ipswich.	"	0
" 24.	"	"	Positive.
June. 1.	Lynn.	"	0
Nov. 14.	Swampscott.	"	0
Nov. 28.	Salem.	"	0

—1900.—

Jan. 8.	Newton.	Dog.	0
Dec. 12.	Watertown.	"	Positive.
" "	"	"	Positive.
" "	"	"	Positive.

You will note that a rabid dog, unaccounted for, probably passed through Ipswich, perhaps during the latter part of 1898, and bit this cow and dog.

During the year 1899 one person from Massachusetts took the Pasteur preventive treatment.

—1901.—

LABORATORY REPORT (Frothingham).

Date.	*Town.*	*Animal.*	*Result of Inoculation.*
Jan. 7.	Waltham.	Dog.	Positive.
" 22.	"	"	Positive.
Feb. 5.	Chelsea.	"	0
Mar. 29.	?	"	0
July 18.	Waltham.	"	0
Oct. 12.	Malden.	"	Positive.
Nov. 18.	W. Dennis.	"	0

In addition to these, fifteen cases were investigated by the Cattle Commission, eight of which were undoubtedly rabid.

—1902.—

Date.	*Town.*	*Animal.*	*Result of Inoculation.*
Jan. 22.	Cambridge.	Dog.	0
" "	Lowell.	"	Positive.
June 3.	Watertown.	"	0
Aug. 6.	Lynn	"	0
" 22.	Newton.	"	0
Dec. 19.	Pittsfield.	"	Positive.

—1903.—

Date.	*Town.*	*Animal.*	*Result of Inoculation.*
Mar. 14.	?	Dog.	0
May 6.	Ware.	"	0
" 21.	Cambridge.	"	0
June 24.	Westboro'.	Horse.	Positive.
Sept. 30.	Stoughton.	Dog.	0
Sept.	Boston.	"	Positive (Dr. Burr).

—1904.—

July 18.	Lowell.	Dog.	0
Nov. 11.	Somerville.	"	Positive.
Dec. 20.	Milton.	"	Positive.

During the year 1901 one Massachusetts person took the Pasteur treatment, and likewise one in 1902 and one in 1903.

The year 1904 marks the beginning of the present outbreak of rabies, with the two cases as shown in the above table. You can, therefore, see that Massachusetts has not been free from this disease for a great many years, although the number has not often been alarming. It must also be remembered that during all these years precautions have been taken to prevent the disease from spreading, such as local muzzling and quarantining, and destruction of dogs known to have been bitten by rabid ones.

—1905.—

The Cattle Bureau investigated nearly three hundred cases of rabies, of which one hundred were undoubtedly rabid.

Laboratory Report (Frothingham).

Positive.	*Negative.*	*Doubtful.*
39	13	2

During the year twelve persons took the Pasteur preventive treatment and two died of rabies resulting from dog bites. Two suspicious dogs were reported in the City of Boston, but examination at the Laboratory of the Board of Health showed they were not rabid.

RABIES IN MASSACHUSETTS, EXCLUSIVE OF BOSTON.

—1906.—

	Dogs.	Cattle.	Horses.	Goats.	Pigs.	Cats.
Killed or died with rabies, .	293	38	5	—	—	—
Killed by owners or died in quarantine, not rabid, but exposed.	256	—	—	—	2	—
Reported as rabid, but found free from the disease.	62	—	—	—	—	—
Released from quarantine, .	380	15	4	2	—	—
Animals died, still undecided,	—	—	1	—	1	—
Still in quarantine Dec. 1, .	98	4	1	—	—	1
Totals, ...	1,089	57	11	2	3	1
Grand total, . . .	1,163	—	—	—	—	—

LABORATORY REPORT (Frothingham).

Positive.	*Negative.*	*Doubtful.*
139	35	13

BOSTON BOARD OF HEALTH.

(LABORATORY REPORT.)

Positive.	*Negative.*
36	11

During the year 1906 eight Massachusetts people died of rabies and one hundred and thirty-three took the preventive treatment. During this year cases in animals were reported from nearly every county in the State. By a legislative act the City of Boston has for some years been permitted to investigate cases of rabies occurring within its limits, and such cases need not be reported to the Cattle Bureau except by courtesy, and are not included in the above or subsequent tables from the Cattle Bureau reports.

—1907.—

	Dogs.	Cattle.	Horses.	Pigs.	Cats.	Persons.
Killed or died with rabies, .	662	21	6	4	4	3
Killed by owners or died in quarantine, not rabid, but exposed.	522	2	—	10	11	—
Reported as rabid, but found free from disease.	46	5	—	—	5	—
Released from quarantine, .	458	6	5	2	3	—
Animals still in quarantine,	209	1	2	—	1	—
Totals, ...	1,897	35	13	16	24	3
Grand total, . . .	1,988	—	—	—	—	—

In addition to the above, the veterinarian of the Boston Board of Health reported seventy-nine cases of rabies in dogs and two in cattle that are not included in the table, making a total of seven hundred and forty-one dogs and twenty-three cattle to have had rabies during the year.

LABORATORY REPORT (Frothingham).

—1907.—

Positive.	*Negative.*	*Doubtful.*
203	60	15

BOSTON BOARD OF HEALTH.

(LABORATORY REPORT.)

Positive.	*Negative.*
41	13

In the year 1907 three Massachusetts people died of rabies and one hundred and sixty-five took the preventive treatment.

You observe by the table that few of the animals reported as rabid were sent to the laboratory for confirmation of the diagnosis. In many cases it was quite unnecessary to do so, as the clinical symptoms with the history of a bite by a rabid or stray dog was sufficient evidence. It is, there-

fore, a commendable custom to send for a laboratory diagnosis only such animals as have bitten other animals or people, those appearing in an uninfected district and such others as it seems for the best interests of the community to have examined.

—1908.—

	Dogs.	Horses.	Cattle.	Swine.	Cats.	Goats.
Killed or died with rabies, .	454	5	32	14	1	1
Killed or died in quarantine, not rabid, but exposed.	412	—	8	87	10	1
Reported as rabid, but found free from disease.	27	—	4	—	2	—
Released from quarantine, .	402	4	3	1	2	—
Animals still in quarantine,	82	—	4	1	5	—
	1,377 1,562	9	51	103	20	2

In addition to these animals there have been at least six cases of rabies in human beings; three in Boston, and the others in Newton, Southbridge and Bernardston. Five of these people had no idea that the dog which infected them had rabies and consequently received no special treatment. The sixth had ample warning, began the Pasteur treatment, then changed to Christian Science.

The Veterinarian of the Boston Board of Health reports fifty cases of rabies in dogs in that city during the year.

—1908.—

Laboratory Report (Frothingham).

Positive.	*Negative.*	*Doubtful.*
120	45	6

Boston Board of Health.

(Laboratory Report).

Positive.	*Negative.*	*Doubtful.*
26	25	2

In 1908 probably more than eight Massachusetts people died of rabies (complete reports not available when this was written) and one hundred and thirty-nine took the preventive treatment.

The unusually large number of pigs in the above table is accounted for by the fact that a rabid dog got into a herd of about one hundred swine and bit several of them, how many was not known. Sometime afterwards a few of these pigs became rabid and died or were killed, and as every now and then one would "go mad" and bite others, it was decided that the only sane method of handling the situation was to kill the whole herd.

The year 1909 has thus far shown a decided and very gratifying decrease in the number of rabid animals, although several people have died of rabies at the Boston City Hospital.

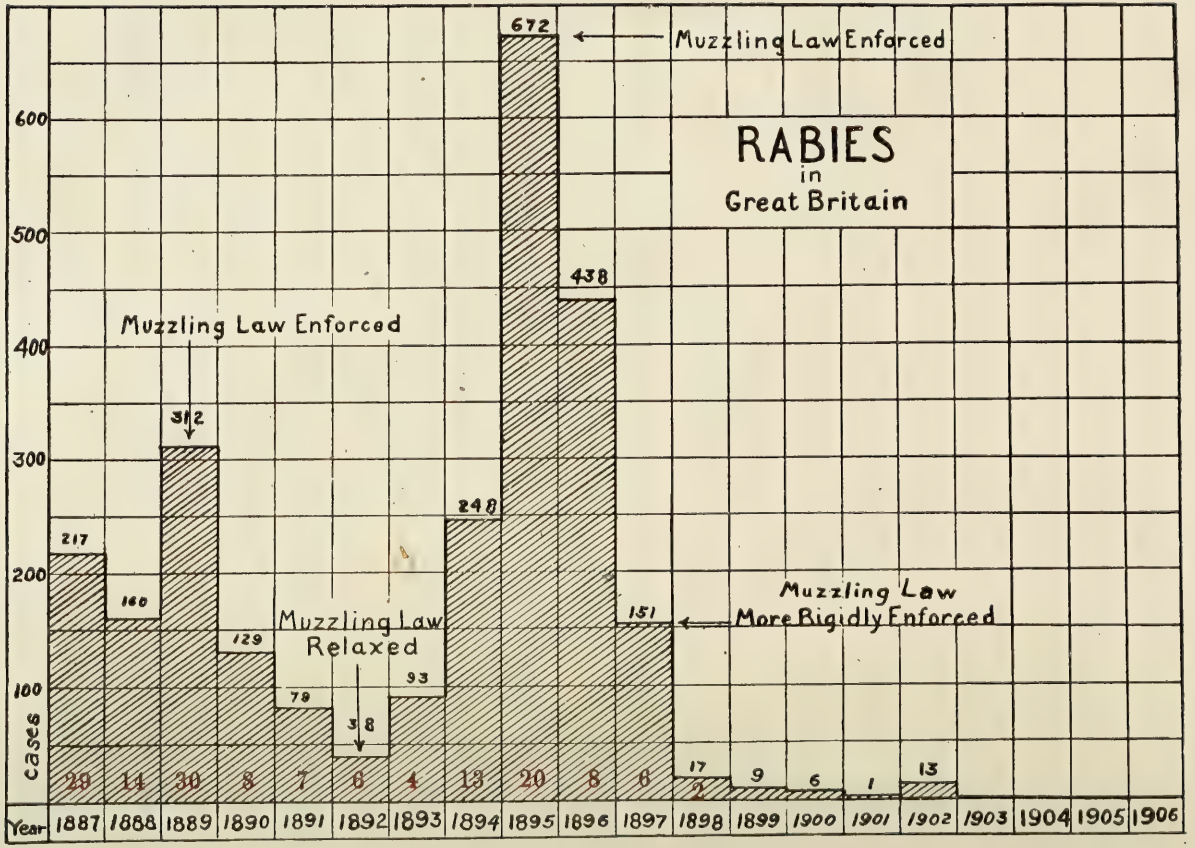
You are now familiar with the conditions as they are and have been in Massachusetts, and it is interesting to note in passing that few States in the Union are not experiencing similar troubles to a greater or less degree, and this brings us naturally to the subject of prevention.

PREVENTION.

It is often impossible or a very difficult matter to cure an infectious disease; on the other hand, it is often a very simple matter to prevent it.

There is no known cure for rabies after symptons have appeared; on the other hand, there is no infectious disease which is so absolutely simple to prevent (and yet so difficult owing to misdirected sympathy of the so-called humane).

Consider for a moment the chief source of infection! It is the bite of a rabid dog, who in certain conditions will run for twenty to eighty miles biting nearly every animal and person it meets. For practical purposes we can exclude all other possible sources of infection. It is perfectly safe to say that, if there were no dogs there would be no



The red figures indicate the number of persons who died of rabies in England and Wales.

Credit for making this Chart is largely due to Mr. Aubrey H. Straus, a student at the Massachusetts Institute of Technology.

rabies, at least in countries where the wolf does not have to be taken into consideration. Therefore, if you wish to prevent rabies, all you have to do is to prevent your dogs from biting, and the only way to prevent a dog from biting is to make him wear a muzzle.

The popular sentiment against the use of a proper, well-fitting, comfortable muzzle, which permits the dog perfect freedom to pant and lap water, and yet prevents him from biting, is the more extraordinary since it is very apt to come from a class of humane people sometimes called "dog-lovers;" * people, often of intelligence, who have visited foreign countries where dogs are always muzzled when on the streets, and yet they never observed any more "suffering" or "annoyance" than among the horses in harness. Moreover, if these people really had the prevention of suffering at heart, they could read the history of rabies and find that wherever muzzling is properly enforced, there rabies is reduced to a minimum, and when the muzzles are removed too soon the maximum gradually returns.

Let me give you one instance of what proper muzzling will do, of course combined with proper enforcement of licensing laws and the destruction of all unlicensed and unmuzzled dogs.

This scheme is so readily grasped that explanation seems unnecessary. The number of cases of rabies here given refer *only to the dog*. Other animals are excluded, and I have only added the number of deaths in man to show how they rise and fall with the number in the dog. Remember that many English people annually took the preventive treatment; for example, one hundred and forty-seven in the year 1892. These are the only figures that I have, but, if so many took the treatment that year when so few dogs were reported, it is fair to assume that the number increased when more dogs were affected.

* I do not refer to that other large class who at bottom simply find the muzzle too much trouble to themselves and consequently flock to the "dog lovers'" banner.

Note that in 1892 there were but thirty-eight rabid dogs in England. At this time the authorities listened to a petition of "dog lovers" and removed the "cruel muzzle," with the result that during the next five years *sixteen hundred and two dogs*, to say nothing of many other animals, and *fifty-one people* died of the most agonizing disease known to the medical world. In spite of this fearful lesson, these humanitarians (?) came again in 1899 with another petition signed by fifty thousand of them asking once more to be relieved of the annoyance of the muzzle. Fearing a repetition of the above calamity, the authorities wisely remained obdurate with the result that in 1903 no case of rabies occurred in England, and there has been none since. The sudden rise to thirteen cases in 1902 is very instructive. These cases occurred in a wild, hilly district of Wales where both people and dogs were difficult to control, but by rigid enforcement of the laws the trouble was stamped out.

The muzzles have been removed from the dogs in England, but will be resumed with the appearance of the first case of rabies. Moreover, there is a strict quarantine of six months imposed upon any dog brought into the country.

Many people argue that the matter was comparatively simple in England, but similar results cannot be accomplished in Massachusetts, as it is not a "little island." This is true to a certain extent only. If all Massachusetts dogs were muzzled and a rabid dog should come over the boundary from a neighboring state and bite a number of our dogs, a certain percentage of these dogs would certainly develop rabies if not destroyed, but our dogs being all muzzled, the disease would spread no further; in other words, it would be kept down to the minimum.

Even local muzzling may be of great value, if properly enforced. For example, not long ago a rabid dog attacked

a number of school children and bit several of them severely, necessitating their taking the Pasteur treatment. This dog ran from a neighboring town where a muzzling order existed at that time, and, had he been properly muzzled or immediately shot for not being so, this calamity could not have occurred. Many similar instances might be given.

Even inadequate muzzling sometimes does much good, for it may succeed in preventing an individual dog now and then from spreading this truly terrible disease.

The question of prevention rests very largely with you, gentlemen, for the advice of no large body of intelligent men is more eagerly sought and heeded than that of the physician, and indifference to any matter pertaining to preventive medicine is not a part of your training.

ARTICLE XXIII.

SOME OBSERVATIONS ON HUMAN RABIES.

By C. F. WITHINGTON, M.D.
OF BOSTON.

READ JUNE 16, 1909.

SOME OBSERVATIONS ON HUMAN RABIES.

For many hundred years so much of superstition and fable has attached itself to the subject of rabies that it is not surprising that the public mind is in a state of confusion and unreasonable variations between extreme terror and incredulity. The portion of the community which is specially interested in the protection of animals, and some of whom apparently hold animal life of more value than human life, have expressed and promulgated doubts and denials as to the existence of the disease. More strangely, this same skepticism has in a few instances been shared by medical men.

The strongest expression of disbelief in rabies in recent years was that given by Dr. Charles W. Dulles, of Philadelphia, before the Pennsylvania Medical Society, in 1884, and his denial of the existence of rabies was also shared in a discussion at about that time by at least one speaker, Dr. Mills. It will be noted that at that time and for a long time afterwards no distinctive pathogenic alterations in the nervous system of persons dying from rabies had been demonstrated. Dr. Dulles, in his paper, referred to cases of *hydrophobia* in the strict etymological sense of the word, that is to say, fear of (drinking) water, which, in his mind, was the diagnostic point of rabies, as occurring in many conditions, as for example angina of the fauces and other disorders of the alimentary canal, spasm of the glottis and other diseases of the respiratory passages, bronchitis, acute rheumatism, etc., but special stress was laid by him upon certain nervous

diseases, one or the other of which he believed to be the actual cause of what had been diagnosticated as hydrophobia, namely, meningitis, cerebral tumors, acute mania with delirium, especially mania a potu, tetanus, epilepsy in its rarer maniacal forms, and above all, hysteria.

The finding of the so-called Negri bodies, which are universally present in cases of true rabies, should set at rest forever the question of there being such a specific disease. While it is exceedingly rare, the universally fatal course of it after it has once developed and the horror of its symptoms make it important for us to recognize it as an actuality. Certain prevalent errors are responsible for some of the confusion as to rabies.

1st. That killing a dog does any good to a patient whom he has bitten. Dr. Hart, of the U. S. Department of Agriculture, in a report of last year, showed that the saliva of a dog might become virulent as long as and no longer than six to eight days before the animal developed symptoms. Hence, if a suspected animal remain healthy for ten days after biting, there can be no danger to the bitten, even if the dog later does become rabid, while the consolation to be derived from the continuance of health in the dog is of the greatest value in relieving morbid apprehensions in the person who has been bitten.

2d. That rabid dogs show fear of water. This appears to be never the case, although in a majority of persons suffering from rabies there is some dread of drinking, from the experience that fluids in the mouth may produce pharyngeal spasm.

3d. That the bites of non-rabid animals or human beings can ever produce rabies. Spontaneous generation has been disproved as conclusively regarding rabies as concerning any other disease. This does not deny the possible virulence of the saliva of non-rabid animals or even of human beings, but does deny that it may produce specific rabies.

4th. That the period of incubation can be exceedingly prolonged. Great doubt is attached to any case in which the period of incubation has been reported to be a year or longer. For instance, in the somewhat celebrated case of Colin, two soldiers, companions in Algiers, in 1865, were bitten by a rabid dog. Both cases were cauterized with a hot iron. One died in a few days. The other died five years later, as was claimed, of acute hydrophobia. The French government felt itself liable for pension in case the second death was due to hydrophobia, because the man had acquired it in the line of his duty, and a careful investigation, therefore, was made. The government finally accepted the case as due to the bite of five years before, but it is extremely doubtful if that view would now be entertained.

We have also the historical case referred to by Tuke in his work on the Influence of the Mind over Body, where two brothers were bitten by the same dog. They separated. One stayed in France, was seized with hydrophobia in a few days and died. The other went to Holland, heard nothing of the fate of his brother until his return after ten years, when he also developed hydrophobia and died.

It is probable that the incubation period in man has a minimum of about eleven days, a maximum not exceeding a year. Four-fifths of the cases develop in the second month and nine-tenths within three months. It is unfortunate, as it is cruel, for a person who has been bitten by any suspected animal to be kept in a life-long state of dread and apprehension.

5th. That because fright may cause death, as in the last mentioned case, all reported rabic deaths are merely due to fright.

6th. That the strap muzzle, as often applied, is thoroughly effective in preventing a dog from biting.

Dr. Frothingham, in the paper to which you have just listened, has wisely emphasized the great importance of

muzzling as a preventive of rabies, and figures which he has presented, which are similar to those collected by other writers, should sufficiently prove that proper muzzling is almost a perfect preventive of rabies. But it requires little observation to see that the law recently enacted in Massachusetts has been in many cases very inefficiently enforced. The ordinary strap muzzle, as sometimes applied, leaves a dog almost as free to snap with his jaws as if he wore no muzzle, and in some cases where police enforcement was extremely lukewarm, the majesty of the law has been satisfied if the dog "wore a muzzle," in the sense of having it tied around his neck.

7th. The superstitions regarding treatment of rabies have in the minds of many sensible people brought some discredit on the very existence of the disease, which was assumed to be combated by such ridiculous measures as the so called madstone, which has long held a place in the popular esteem. These stones have been found to consist usually of balls of hair removed from stomachs of various wild and domesticated animals. Their users claim that if the "stone" on being applied to a bite, adheres to the wound, it is a sign that it is drawing out the virus and that the patient will get well, but that if it falls off, it will be powerless to relieve; the fact being, of course, that the porous mass of hair, if thoroughly saturated by blood or secretions, is likely to adhere, and if not, will fall off.

A medical family in Pennsylvania obtained fame as healers of rabies, and one of the pills which they furnished was found to consist of bread crumbs with a paper containing the word *abracadabra*.

My own personal observation of rabies has been limited to two cases which have occurred in the City Hospital within the last year. One has been reported in detail in the Boston Medical and Surgical Journal.* I will refer to it only briefly.

* Vol. clvii, No. 16.

The boy had a lacerated bite on the upper lip. He received no Pasteur treatment. He developed his first symptoms on the 102d day. There was no hydrophobia, but great pharyngeal and laryngeal spasm, both recurring at decreasing intervals. The former was precipitated by an attempt to eat or drink, and showed itself by his jumping up in bed and spitting, with great violence, a frothy or viscid saliva. Spitting in each case followed a gasp for breath.

The first impression in watching this patient was one of hysteria, as the boy was aware that he had been bitten by a suspected dog and had been reported in the papers as being the victim of hydrophobia. For a time persuasion and suggestion appeared to mitigate the attacks, but they soon became much more violent. He fell out of bed, had clonic movements of hands and legs, with extreme salivation. Within the last two or three hours of life he was wildly delirious, with extreme clonic movements of arms and legs, nearly constant, laryngeal and pharyngeal spasm and marked cyanosis. Large amounts of reddish froth exuded from nose and mouth. He had extreme dyspnœa, rolling of eyeballs and an intermittent sharp high-pitched cry. Etherization caused very slight and temporary relief. He had delusions of persecution, and in his less violent intervals said that everybody seemed to think he had hydrophobia, but he was sure he did not have it, and that if his hands were untied he would act quietly and behave himself. He also kept asking for water and stated he was sure he could drink it without trouble. An attempt to drink it brought on a much more violent paroxysm of convulsions and intense cyanosis, and was soon followed by death.

On December 23 and 24, 1908, three persons were bitten by a dog not known to be rabid. The subsequent history of the dog was unknown. The patients were all cauterized by the same physician. One of these patients received Pasteur treatment, and so far as known has never

had any symptoms. The cases of the other two persons will now be described.

Case I.

George R., æ. 34, married. Canvasser.

Entered hospital March 5, 1909, 11.30 A.M.

Dec. 24, 1908, was bitten on the forefinger of the right hand by a dog not known to be rabid (see next case). Subsequent history of the dog unknown. Wound bled freely. It was cauterized by a physician, but to what extent or in what manner is not known.

Treatment was begun with serum supplied by the Pasteur Institute of New York, Dec. 27. The fluid was sent by express daily from New York, with definite directions as to the dosage. It was injected daily by an externe under the supervision of the out-patient department. Twenty-six injections were given, covering a full course of twenty-two days.

The dosage given was as follows:

First	4	days,	2	injections	daily,	3	cc.	each.
Next	3	"	1	"	"	2	"	"
Next	2	"	1	"	"	$2\frac{1}{2}$	"	"
Next	13	"	1	"	"	2	"	"

Treatments ended Jan. 17, 1909.

Patient returned Feb. 4 for inspection, and was without symptoms.

The patient felt about as usual, but had rather a poor appetite and constant chilliness.

March 3, sixty-nine days after the bite was received, he was tired and feverish and stayed in bed. Towards night he had sore throat and felt cold. During that night he awoke every half hour with twitching, especially of the arms.

March 4, throat worse, neck swollen, very thirsty, but could not drink. Shook violently every few minutes. Lips blue and eyes staring and glassy. He asked continually for water, but never could swallow it. The same symptoms continued through the night, becoming more intense. This morning he was irrational during the convulsions, but perfectly clear between them. All his senses seemed very acute. He had attacks of cough in which he became very blue.

He has taken no food for four days. He has vomited considerable brown fluid without blood. Some pain and stiffness in back of neck; no headache. Slight incontinence of bladder and rectum.

I saw him immediately after he was admitted. He was in a state of great agitation. This with the frequently recurring convulsions, prevented any formal physical examination. Pulse 150.

His mind was clear, and his speech, though rapid, perfectly intelligible. Being given a piece of bread, he held it in his hand, but would not put it in his mouth. When a morsel was put between his lips he held it a minute, then rejected it, usually with the onset of a convulsion. When water was presented to him he motioned it away and would not take it in his mouth.

The paroxysms occurred about once in two or three minutes. During these he was uncontrollable, mentally and physically. He gasped for breath, jumped up in bed, and threw himself so violently that he would certainly have gone onto the floor if he had not been held. He was deeply cyanosed, the eyes staring. The hands shook violently, and the pieces of bread he had taken into his hand were crushed, partly thrown about, but partly retained in the clenched fingers.

After such an attack passed off, he relaxed, but, though he was manifestly frightened, answered to his name. He said he thought there was smoke in the room. He vomited some dark brown material. With the coming on of a new attack his mind clouded again, and possibly his sight. He turned, when spoken to, in the direction of the voice and spat toward it. There was less incessant spitting of saliva than in the case I have previously reported.

During the five hours that intervened before his death, the attacks became more frequent and more violent. After the first half hour or so, he was irrational even in the intervals. He talked incessantly and rapidly; but not even his wife could make out what he meant. He always gave the impression of being in mortal terror.

Death came to his release at 4.39 P.M.

Autopsy, 21½ hours after death.

Marked lividity of the dependent parts. Dusky face. Pupils equal, 1 mm. Conjunctivæ red. Small vessels much

dilated. No œdema. Superficial abrasions over both elbows and right tibia. (These were probably due to the violence of the struggling in the paroxysms.)

A small punctured wound was found over the dorsal aspect of the fifth metacarpal bone, and an indistinct white scar on the second phalanx of the fourth right finger. (It will be noted that neither of these corresponded to the site, as described, of the bite.)

The left ventricle of the heart was contracted, the right ventricle and the auricles relaxed. The myocardium firm and of deep red color.

The parotid glands were apparently congested. The papillæ at the base of the tongue were larger than usual.

The diploe of the skull was fairly well marked. The dura tense and of light blue cast. The vessels of the pia moderately injected. Even the finest ramifications over the convolutions were to be seen. Considerable sub-pial œdema. The brain substance slightly firmer than usual. Marked contrast between the grey and white substance. Surface of section moist. Lateral ventricles have slight excess of clear fluid. Serial sections of basal nuclei, pons, cerebullum and medulla appear normal. (Preliminary microscopical examinations made at this time showed the Negri bodies at the base of the brain, but the detail work to show the distribution of these bodies has not yet been completed.)

Vessels at the base normal. Gasserian ganglion, no gross change. Middle ears, the mucous membrane lining them is markedly congested. Otherwise, middle ears normal.

Cord, vessels markedly congested. Neural canal is of general red color to bluish, with marked congestion of blood vessels.

Case II.

Jamon P. (Service of Dr. Sears.) Entered hospital May 20, 1909.

Was bitten on the left ring-finger, Dec. 23, 1908, by a dog not known at that time to be rabid, and which was never found afterward. Of two other persons bitten at the same time and by the same dog who took the Pasteur treatment, one was Case I, just described, who died March 5. The second, so far as known, has developed no symptoms.

The third case, the present patient, refused Pasteur treatment. The same doctor cauterized the wounds of this and Case I.

For two days before admission, the patient had been feeling nervous and excited. While working May 20, had an attack of twitching and a spasm of the throat.

On entrance, conscious, rational, somewhat violent. Jaws held rigid. Neck not rigid nor tender. Many glands palpable. Eyes wild and staring. After entrance remained for a short time rational. Respiratory spasm increased. At times horribly terrified and crying out. Pulse soon began to fail. Cough, with tenacious sputum. The next morning, May 21, coughed and vomited blood, at 5 A.M. After this rapidly weakened but remained active to the end. Death on the 139th day after the bite.

The Negri bodies were found at autopsy as in the other cases.

Case III.

Thomas G. (Service of Dr. Ames.) Age, 10. Admitted Oct. 2, 1908.

Was bitten on lip by a dog, Aug. 27, 1908. Sister was also bitten by same dog, but as yet has developed no symptoms.

34 days after the bite, viz., Oct. 1, pain in stomach, followed by headache. Slept none last night. At two o'clock in the morning of Oct. 2, became excited, refused water, saying it would make him have a fit. Delirium is increasing hourly. Examination. Frothing at the mouth. Rational between the attacks. Pupils dilated. Eyeballs rolling. Neck not rigid, tender or retracted. Heart, area normal, action rapid, irregular, no murmurs.

Extremities, no Kernig or Babinski.

Oct. 3, convulsions have continued through the night, patient gradually grew weaker and died at 1 P.M.

Autopsy. The summation of anatomical diagnosis was:

Rabies. Negri bodies found.
Hyperplasia of lymphoid bodies of intestine.
Persistent thymus.
Dilatation of heart.
Chronic pachymeningitis.
Congestion of brain and cord.

A special interest attaches to this case from the fact that the patient had the status lymphaticus, in which one is rather liable to sudden death.

It is particularly disappointing to have to record the death of the patient who was treated by Pasteur injections promptly and fully, treatment beginning on the third day. These injections were made in accordance with directions forwarded by the Pasteur Institute of New York, which was given the history of the cases, and in this case as in several others which have been bitten by suspected animals in Boston, the injections were given under the direction of the out-patient department of the City Hospital. The work was done by externes, and in no case, as far as is known, of the many injections given was there any local or constitutional disturbance. The material was forwarded daily by express from New York, the dosage for each successive day being clearly indicated. It may be interesting to say that the price required for material for such a course of treatment, including the sending by express of the daily dosage, is $25. In most cases this expense has been met by the City of Boston. The cost of the course of treatment at the Institute in New York, including board and room, is said to be from $100 to $150.

It is well known, of course, that the principle of these injections is that of attenuation by drying of the virus of spinal cords of rabbits which have died from the inoculation of the so-called "fixed virus" of rabies. The cord is removed aseptically and suspended in a glass jar whose floor is covered with pieces of caustic potash. These are kept in the dark, at a temperature of 68° or 72° F. for varying periods of time. The cord is cut off in sections and rubbed up in bouillon as required. The Pasteur method in wounds of the upper extremity is to give on

1st day 3 cc. of 14–11 day old cord.
2d " 3 " " 10– 7 " " "
3d " 2 " " 6 " " "

4–5th	day	2	cc.	of	5	day	old cord.
6th	"	2	"	"	4	"	" "
7th	"	1	"	"	3	"	" "
8th	"	2	"	"	3	"	" "
9th	"	1	"	"	3	"	" "
10–11th	"	2	"	"	5	"	" "
12–13th	"	2	"	"	4	"	" "
14–15th	"	2	"	"	3	"	" "

In the so-called intensive method of Pasteur treatment, which is applicable in wolf bites and dog bites upon the face, the dosage is accelerated and is as follows:

Day of Treatment.	No. of Days Cord Desiccated.	Dose Injected.
1, A.M.	14	3 cc.
	13	
P.M.	12	
	11	
2, A.M.	10	3 cc.
	9	
P.M.	8	
	7	
3, A.M.	6	2 cc.
P.M.	6	
4	5	2 " (same as on 5, 10, 11, 16, 19th days.)
5	5	2 " (same as on 8, 12, 13, 17, 20th days.)
6	4	2 "
7	3	1 "
8	4	2 "
9	3	1.5 cc.
10	5	2 cc.
11	5	2 "
12	4	2 "
13	4	2 "
14	3	2 " (same as on 15, 18, 21st days.)
15	3	2 "
16	5	2 "
17	4	2 "
18	3	2 "
19	5	2 "
20	4	2 "
21	3	2 "

We all remember the dramatic incidents connected with Pasteur's first administration of his treatment to a human subject. Joseph Meister, a boy of nine, who was bitten on July 4, 1885, was after much deliberation and consultation with the leading surgeons of Paris, and under their strong advice, subjected to his first inoculation July 6, 1885. We also recall the four American boys sent over by Dr. O'Gorman, of Newark, N. J., for treatment, in December, 1885. These all, with many others, escaped the disease.

Pasteur's first failure, in the case of Louise Pelletier, nearly caused the suspension of treatment by reason of the severe criticism to which he was subjected in that case, but her treatments were not begun till the 37th day after she was bitten. Immediately after this failure, there arrived nineteen wolf-bitten Russian cases, of whom, under ordinary circumstances, it was expected that all or nearly all would die, and sixteen of them remained well.

The total figures of the Pasteur Institute in Paris for the twenty years from 1885 to 1905 were that 20,201 persons were treated. The mortality of the first year was 0.94%; that of the last three years, 0.32%.

It has been conceded that the average mortality of all persons bitten by rabid dogs is about 16%; in other words, that one in six of persons so bitten develops the disease. Practically all who develop it die of it. The mortality from bites of rabid wolves is much larger. The bites upon the face are much more serious in their prognosis than those elsewhere, and the hands come next. It is believed by many that the virus follows the nerve sheath rather than the vascular supply, and that hence localities having the richest nerve distribution are the most dangerous. Bites in portions of the body covered by clothing are much less dangerous by reason of the saliva being excluded from the wound through the clothing.

The figures quoted by Ravenal from the Pasteur Institute in Kharkoff were, of 8,430 persons bitten by rabid dogs and inoculated, 77, or 0.91% died, and of 193 bitten by rabid wolves, 32, or 16½%, died. The figures of the Pasteur Institute at Odessa show that of cases beginning treatment in the first week, 0.56% died, and of cases beginning only in third week, 3% died.

A form of paralysis has sometimes been observed in patients subjected to Pasteur treatment. It always affects the lower limbs and often the bladder and rectum. It develops between the eighth and last days of the course of treatment. Sometimes the paralysis stimulates Landry's. But little is known about it, except that it is not due to pneumococcus or streptococcus infection. All the patients are said to recover in from one to twenty days. No other ill effects of Pasteur treatment have been shown.

Despite the unfortunate result in the case above referred to, we must conclude that results up to the present time indicate, on the whole, a favorable result from Pasteur treatment. Let me remind you of the report of a committee of inquiry appointed by the Local Government Board of Great Britain to inquire into the Pasteur treatment of hydrophobia. This report is signed by eight eminent British physicians,—James Paget, T. Lauder Brunton, George Fleming, Joseph Lister, Richard Quain, Henry E. Roscoe, J. Burdon Sanderson and Victor Horsley, and is dated June, 1887, two years after the Pasteur treatment had been in operation.

Mr. Victor Horsley made the experiments in confirmation of Pasteur's experiments, and says: "All the experiments performed by Mr. Horsley have confirmed those of M. Pasteur and have shown that animals may be protected from rabies by inoculation with material derived from spinal cords prepared after M. Pasteur's method. The protection may be deemed somewhat similar to that given by the inoculation for anthrax or by vaccination for smallpox."

The committee say: "We think it certain that the inoculations practiced by M. Pasteur on persons bitten by rabid animals have prevented the occurrence of hydrophobia in a large proportion of those who, if they had not been so inoculated, would have died of that disease."

ARTICLE XXIV.

THE DIAGNOSIS OF ULCER OF THE DUODENUM.

By ERNEST A. CODMAN, M.D.
OF BOSTON.

READ JUNE 15, 1909.

THE DIAGNOSIS OF ULCER OF THE DUODENUM.

In offering this paper to you I am strongly conscious of two things. The first is that I have some really important information to give you on this subject, and the second is that I am unable to state it vividly enough or interestingly enough to make you realize it. I am aware that in one reading of this paper you will not be able to grasp and assimilate the statements made in it. Every one of them has been carefully considered and has evidence behind it if you will take the pains to examine it. Before criticizing it too severely, I beg you to reread it, and also to read another paper which is about to be published in the *Boston Medical and Surgical Journal*, on the Importance of Distinguishing Simple Round Ulcer of the Duodenum from those Ulcers involving the Pylorus or arising above it.

The statements which I make in these papers are not entirely original, for Moynihan in England, Mayo in the West, and John Munro here in Boston, have been preaching the best of them for some years. My chief claim for your attention is that a study of fifty cases of *proved* duodenal ulcer from the records of the Massachusetts General Hospital shows that these gentlemen have been right in the main in their claims that duodenal ulcer is a common disease which we all meet and which we can diagnose and cure if we try to. It is at least twice as common as gastric ulcer and nearly as common an acute appendicitis.

In preparing this paper it seemed to me that a study of a series of proved duodenal ulcer cases would be more in-

structive than a review of the literature of the subject which is so much confused with gastric ulcer. I have, therefore, taken from the records of the Massachusetts General Hospital, during the last twelve years, all the cases proved by autopsy or operation to be true duodenal ulcer. (Perforation cases are included because perforation is merely an incident of the disease. The perforation is acute, the ulcer is not.) Clinical cases not definitely proved duodenal ulcer have not been included, and even cases supposed to be duodenal ulcer at operation but in which the surgeon evidently had some doubt, have, with two exceptions, been discarded. I have also included three cases operated on in my private practice and one antopsy of a case not operated on. Case fifty was that of a personal friend operated on by another surgeon.

In all I have 50 cases, 11 of which I have operated on myself, and 25 of which were operated on by other surgeons.

That a study of the diagnosis of duodenal ulcer is needed is well shown by the reading of the records of these cases. The diagnosis was rarely arrived at before operation, and in many cases only at autopsy. The most common errors were, confusion with appendicitis, gall-stones, and gastric ulcer in the more severe cases, but dyspepsia, hyperacidity and neurosis of the stomach were the scape goats in the earlier and milder cases. Even at operation with the hand in the abdomen, cancer of the pylorus and cancer of the head of the pancreas were given as the probable diagnoses by good surgeons in two cases. Autopsy showed that they were misled by the inflammatory thickening about simple round ulcers, a centimetre or two in diameter. And here let me say that pathologically, duodenal ulcers present, according to Dr. Wright's careful autospy records, a remarkable monotony. They are always close to the pylorus, and are either a single round ulcer 1-2 cm. in diameter or perhaps two or three ulcers arranged in a circle, or in a few

cases a continuous, narrow encircling ulcer girdling the duodenum a centimetre or two below the pylorus. I have not included in this study the pyloric ulcers which are usually supposed to be gastric in origin, although I firmly believe these to be usually duodenal, as I have explained in a recent paper.

I do not propose to use these 50 cases statistically, tabulating the age, sex, occupation, duration, etc. In these respects this series simply reinforces the statistics from other collections. They were mostly males between 20 and 50. Their occupations were so diverse as to render any conclusion as to etiology from that cause unlikely. One thing was striking in this respect, however, that this disease is one of active, hard-working men. It is not a lazy man's disease. It affects individuals who work hard and get their meals irregularly. One teetotaler amongst them also makes an exception if we try to consider alcohol as a cause. Many of them, nevertheless, were drinking men.

Perhaps the most strinking thing in these histories is the clinical variety compared with the pathological monotony.

Duodenal ulcer, like tumor of the brain, has its cardinal symptoms, and yet any one or all of these symptoms may be absent, especially in the early stages. Just as in tumor of the brain shortly before death we get headache, vomiting and blindness plainly developed, so in duodenal ulcer, perforation, exhausting hemorrhage or obstruction of the pylorus bring the patient to the surgeon or pathologist. A tumor of the brain may exist for years without vomiting, headache or optic neuritis, and the skillful diagnostician must make his diagnosis when the first one of these symptoms appears without waiting for the others. A duodenal ulcer may exist without pain, vomiting, hemorrhage, perforation or obstruction of the pylorus. This is shown very strikingly in this series. Case 23 bleeds and has no pain. Case 9 suffers intensely from pain and never bleeds. Case

5 perforates and until the day of perforation has no pain or bleeding. Case 11 has pain and bleeding, but never vomits. Then Case 48 has all of the symptoms, and it is evident that the converse must be true, that there must be cases which have no symptoms, except negligable dyspepsia, and which heal naturally and completely.

There is one feature, however, that is pretty constant, and this is pain. Although a few cases occur without it, in the great majority it is present. I believe that this pain is characteristic enough to justify a provisional diagnosis without the other symptoms. This symptom of pain is like the feeling of rigidity of the abdominal muscles in acute appendicitis. We have grown to rely on it in making our diagnosis. I think most of us would be willing to put a pretty high wager on the diagnosis of acute appendicitis when we get that peculiar feeling of rigidity under our hand, even if we did not hear the history of the case or make a full examination. The pain of duodenal ulcer seems to me of the same relative importance.

When a young or middle aged man complains of a severe, though bearable pain, when the stomach is just becoming empty a couple of hours after his meals, and if at times he is subject to relatively acute attacks with more continuous pain, epigastric tenderness and vomiting, you may suspect duodenal ulcer. If he is an active hard working individual and interested in his work, but unable to enjoy it because tormented by this pain, you may be fairly sure of the diagnosis. It is more than likely that you will find that he has attributed his trouble to different articles of diet which any healthy man ought to digest perfectly. He has cut out one after another of these articles, so that he is practically starving himself in the vain effort to get the particular articles which cause his pain removed from his diet list. You will think him fussy and put him down as a nervous dyspeptic. As a matter of fact, he would not be able to get rid of his

pain entirely by the most judicious diet. Some patients find this out, and instead of starving themselves eat three extra "between meals," and these patients surprise you by looking so stout and well, and yet complain of their stomachs. Their healthy appearance, apparently incompatible with a serious lesion, makes you put them down as nervous. If they are able to take rest enough to digest this extra food, they get along pretty well, but a little hard work tiring them out and interfering with their natural digestion makes them start down hill again. Improvement from rest, a careful diet and freedom from work and worry, may be expected in duodenal ulcer as well as in nervous dyspepsia. But the very individuals who have duodenal ulcer are difficult ones to drive away from work. Exploratory operation may be necessary to convince them that their disease is organic and not "nervous."

In looking over these histories it has seemed to me that many mistakes might have been avoided if attention could have been focused on the primary symptoms in these cases. By primary symptoms, I mean the daily painful dyspepsia complained of apart from the acute attacks which represent symptoms from an acute or subacute inflammatory condition of the parts surrounding the ulcer.

The uninflamed, quiescent, chronic duodenal ulcer is a tiny insignificant thing in appearance. As I have pointed out recently, it lies during closure of the pylorus, in the puckered folds of mucous membrane just outside the sphincter and is comparable to a fissure in the anus. When the pylorus is closed the round ulcer becomes a longitudinal fissure and mucous membrane becomes apposed to mucous membrane. At this time it would be difficult for food or secretion, either acid or alkaline, to come in contact with its infolded surface. This is the comfortable time experienced after a meal. When the food in the stomach becomes acidified it unlocks the pylorus and begins to pass on into the duodenum.

At this time the ulcer is exposed and pain occurs. As the pylorus relaxes the fissure becomes the round ulcer, and I believe it is possible that it even becomes a tranverse fissure when the longitudinal fibres of the pylorus contract. Some of these ulcers actually look a little diamond shaped, as if they had been pulled alternately in the longitudinal and transverse directions.

Microscopic sections of these ulcers show that at times the induration about them is almost nil, while at other times it is very great, so great that clinically the whole mass is said to be "the size of an egg," and is perhaps mistaken for cancer.

Now this inflammatory and œdematous exudate about an ulcer is absorbable and varies from time to time in extent. It consists of congested and œdematous tissue comparable to the induration about a boil or any other sore. The parallel with fissure of the anus is again applicable. The fissure at times becomes acutely inflamed, indurated and agonizingly tender. The "acute attacks," to which cases of duodenal ulcer are subject, can be better understood if we consider them due to these exacerbations of inflammation about the periphery of the ulcer. The adjacent lymphatic glands may also enlarge. At these times the spreading inflammation temporarily inhibits the action of the pylorus, and the symptoms take on an obstructive character as if there was really an ulcer of the stomach at the pyloric end. Perhaps the induration actually prevents the infolding. The stomach then will either not retain food well or shows a mild dilatation.

This is what I mean by confusing the secondary with the primary symptoms, for, as a rule, it is during one of these acute epochs that the patient seeks medical advice. At these times they resemble gastric ulcer cases, and we find tenderness, vomiting and perhaps slight dilatation.

If the patient is put to bed, placed on a non-irritating

diet and given a rest of a few weeks, the inflammatory symptoms subside. The pylorus functionates again without squeezing the imflamed tissue; the vomiting ceases, or the temporary dilatation, if it existed, disappears. As soon as the balance of nutrition is established by sufficient food, the patient feels well again, and even slight digestive disturbances and "hunger pain" may disappear for a time. He resumes work with the original little round ulcer still there, but the inflammation about it gone. Then the cycle begins again. Over fatigue (the vertical position allowing the duodenal juices to back up on the pylorus) or congestion following an exposure to cold, or over indulgence in alcohol, bring on another acute attack.

In my recent paper I have also outlined how these repeated attacks eventually cause an encircling ulcer which by progression stomachward forms the so-called pyloric ulcer, which produces mechanical stenosis. Again the parallel with fissure in the anus is applicable, for it too, by prolonged spasm and cicatrization, causes stricture.

Besides secondary symptoms, due to these exacerbations of inflammation, we have perforation and hemorrhage to consider. These complications are accidents of the disease and not primary symptoms. They depend on the situation of the ulcer. If its base happens to be on the free peritoneal surface a sudden increase in the gaseous tension inside the gut blows out the thin base, and general peritonitis occurs. If on the other hand, the ulcer happens to be posterior and abutts on the pancreas, a zone of inflammatory tissue will probably prevent true perforation, and we get merely a very severe acute exacerbation.

In my recent paper I have also given evidence to show that hemorrhage, too, is an accident of location. If the base happens to come on a big vessel (usually the pancreaticoduodenalis artery, which passes transversely behind the ulcer-bearing area) there will be hemorrhage; but if the

vessel is small, the zone of inflammatory and cicatricial tissue prevents bleeding. My series bears me out in this statement, for where there was any hemorrhage found it was at one time or another grossly present in the stools. It was only found in twelve of the fifty cases. Reliance on hemorrhage as a *sine qua non* of duodenal ulcer has been the chief cause of failure to make the diagnosis. If it is present, however, it is most reliable, and with characteristic hunger-pain makes the diagnosis almost certain.

There are a few other minor symptoms which I will take up categorically. Tenderness.—This is present during the "acute attacks" and also often during the quiescent interval at the time of the hunger-pain. When the stomach is comfortably full and no hunger-pain is present the tenderness may disappear. It is often difficult to elicit because it is high under the ribs. If the examiner puts his fingers gently under the ribs, slightly to the right of the median line, and the patient takes a long breath, a tender point may come down to the examining fingers. The patient usually locates the tenderness below the ensiform, but when an accurate examination is made it is found to the right. The tenderness may be accompanied by a distinct muscular spasm in the acute attacks; and in two of my cases right-sided costal rigidity was very striking.

Belching is frequently spoken of in the histories. "Relief by belching" is such a common symptom of any trouble in the epigastrium that it seems to me of little value. Although many patients state that they get relief by belching, when you cross-examine them you find that they belch from the hope of relief rather than because they really get it. Belching may be due to the unwillingness of the pylorus to dilate enough to allow the gas to pass downward. If the cases are at all severe, the relief is very transient.

In the early stages the patient is also inclined to attribute his pain to the lower bowel, and sometimes "feels that if

he could only pass wind the pain would be better." These sensations may be present even if there is no distension, and on the contrary the abdomen is retracted and concave. Constipation and diarrhœa are mentioned in some cases; but there are enough cases where the bowels move normally to make it unlikely that these factors are important either in the etiology or the diagnosis. Constipation by overloading the bowel undoubtedly contributes to the drag of the mesentery and to the tendency to regurgitant peristalsis. According to my theory this would flood the first part of the duodenum with pancreatic and biliary secretions, and thus contribute to the irritation, if not cause the tendency to ulceration.

It seems not unlikely that some of the symptoms referred to the large intestine may be due to the close proximity of the hepatic flexure to the first part of the duodenum. Thus by contiguity, especially if there were mild peritonitis with the formation of adhesions, a certain amount of irritation of the colon would be caused. This might be expressed by constipation, diarrhœa or an irritating desire to pass wind. Our ability to subjectively localize abdominal sensations is at best poor.

Jaundice occurs in a considerable number of cases, usually in transient attacks, and probably due to inflammation of the mucous membrane of the duodenum, started up by the presence of the ulcer. In most cases it is milder and more fugitive than the jaundice associated with gallstones.

The vomiting of duodenal ulcer cases is pretty characteristic. In the first place it only occurs during the acute attacks, when the pylorus is temporarily disabled. If the process has lasted long enough to become a firm pyloric stricture, it may be more like the vomiting of true gastric dilatation. As a rule it lasts only a few days and passes away when the stomach is rested. In the second place, it occurs some time after the meal, because the pain is usually

least after the meal is taken and before it is digested enough to open the pylorus. The vomiting comes at the height of the pain. In the third place, the vomitus itself shows complete digestion of the food and, in fact, is usually yellowish or greenish mucus, or, if the case is a bleeding one, it may contain regurgitated blood. If the case is an old, severe one, it may have the character of obstruction and show food eaten long before. Such a case will be so marked in other respects that the diagnosis of pyloric stenosis will be easy at any rate.

In some cases, I believe, it is possible to trace the period of duodenal symptoms changing to obstructive ones. This should be an important point in every gastric ulcer history.

Cases diagnosed as gastric ulcers, which give a history of pain and distress off and on for a long period before vomiting began to be a symptom, are almost always duodenal. Long continued painful dyspepsia with occasional attacks of pyloric symptoms is the important combination to look for in duodenal cases.

Besides the histories herewith presented of duodenal ulcer, I have looked over a large number of the histories of cases at the hospital, both in the medical and surgical records, in which this combination was perfectly evident. Although these cases are classed as gastric ulcer, both by the diagnostician and by the operating surgeon, I have no question that the lesion was duodenal.

In future the diagnostician must consider duodenal ulcer as far the most probable cause in cases presenting the clinical signs of either temporary or permanent pyloric stenosis. "Gastric ulcers" must be called duodenal, or at least we must say duodenal or gastric, instead of *vice versa*.

The stomach tests, such as chemical analyses of test meals and percussion of the distended stomach, are of little help in the diagnosis of duodenal ulcer. This fact is self evident, for during the past ten years stomach analyses have not only

been carefully done, but even carefully over-done, and yet very few diagnoses of duodenal ulcer have been made. In this series there is nothing to contradict the usual experience that the gastric analyses are normal, or nearly so, in these cases, and only of negative value. Where they do show pathological signs, as dilatation or retention of food, we may feel confident that the pylorus is interfered with at least temporarily.

Next to pain the phenomena known as "sour stomach," "heart burn," and "hyperacidity" are the most common symptoms complained of. These sensations are difficult to define. We all probably know pretty well what they mean by these complaints, for there are few of us who have not experienced them ourselves. Sometimes the chemical analyses of gastric contents in cases complaining of these symptoms show an absolute or relative excess of hydrochloric acid; but I am told by Dr. Joslin, who is an expert in such examinations, that these findings are by no means constant, and that some cases complaining of the usual symptoms of hyperacidity actually do not have an excess of acid; and furthermore, that the methods in vogue of testing the quantity of acid are by no means accurate.

In previous papers I have suggested that the relief in these cases obtained by taking such alkalis as bicarbonate of soda is by no means a proof that the pain is caused by the acidity. It may be that the relief is due to closure of the pylorus, for Cannon has shown that acidification of the gastric contents causes the pylorus to open. Thus, if it be granted that the fissure theory which I have alluded to is reasonable, closure of the pylorus when the alkali is taken is the direct cause of relief by infolding the raw surface of the ulcer. Be this theory true, or that of the direct action of the acid the right one, these cases of duodenal ulcer do, as a rule, show pronounced symptoms of this character. In most cases these symptoms, like the hunger-pain, come late after the meal. In my opinion when they are persistent

and accompanied by pain which is severe, though bearable, in otherwise healthy men, a provisional diagnosis of duodenal ulcer should be made.

The sensation of "sour stomach" is a common one in any gastric disorder, and moreover the term is a popular one and the readiest expression which an ordinary patient can use to describe distress in the epigastrium. It would be difficult for any one to tell the difference in sensation between a hyperacidity and the distress caused by bitter, acrid bile and pancreatic juice. Those of us who have been seasick know that the third or fourth vomiting is far more distressing than the first deluge when the contents of the stomach appears. It is my belief that bile and pancreatic juice rising in the intestine, as far as or through the pylorus, may give rise to painful sensations which are felt in the stomach, because our localizing sense in this region is not accurate. I am sure that I can myself recognize a pain in the epigastrium and yet feel that my stomach is functionating well.

I am not radical enough to say that every case of "hyperacidity" is a duodenal ulcer, but I do believe that many are, and further, I believe that some of the milder cases may be due to the reflux of the irritating pancreatic secretions into the first part of the duodenum. Please bear in mind that in this paper and my recent one, to which this is a sequel, I have referred only to deep ulcers. Erosion of the mucous membrane in the same region may be responsible for some of the cases which do not last long enough to justify the diagnosis of true ulcer. Purely functional gastric neurosis in otherwise healthy young or middle aged men, I am very skeptical about.

I have recently shown that there is some reason to believe that duodenal ulcer is pretty common, the proportion found in the autopsy statistics at the Massachusetts General Hospital being one in a hundred, at least, and yet no scars of healed ulcers are found. This necessarily means that all

duodenal ulcers fail to heal or else that all healed scars escape notice. I cannot believe that nature has no power to heal these insignificant little ulcers, so that I am logically driven to the conclusion that many heal. You will notice that in two of these cases the cause of death was an accident —one a suicide and the other a crush from a vehicle. The ulcers were found incidentally. I should explain some of the much talked of cases of association of duodenal ulcers with burns in the same way. If painful gastric neurosis is common, so is duodenal ulcer. There are many minor points which are suggestive of duodenal ulcer which I have not time to dwell on, but I will take up briefly what seem to me the important points in differential diagnosis of this disease from 1. Gastric ulcer. 2. Gallstones. 3. Appendicitis.

1. Gastric ulcer.—*Cases of supposed gastric ulcer, which in the early part of their history, complain of hunger-pain and sour stomach without vomiting, are likely to be duodenal.* This is made more probable: if they are young or middle aged men; if the history is of long duration without material change; if they are subject to occasional exacerbations when the symptoms have a pyloric character; if they are comfortable with a full stomach and in pain when it becomes empty; if there is tenderness or rigidity in the gall bladder region; if the vomiting is not persistent, is small in amount, contains no food, and occurs late after ingestion of the meal. If there is blood in the stools and none in the vomitus or stomach washings it is almost certainly duodenal. Blood in the vomitus or stomach washings is not incompatible with duodenal ulcer, however, for blood may be regurgitated into the stomach just as easily as ordinary bile is. Vice versa, blood of stomach origin may also be found in the stools.

The absence of blood in the stools is far from being an exception in duodenal ulcer. It is more likely the rule.

The ulcer which does not bleed freely at some time does not bleed at all. Nevertheless, repeated examinations of the stools for occult blood should be made in suspected cases, because if blood is found, it is, with the other symptoms, almost positive evidence.

2. Gallstones.—Duodenal ulcer cases which have typical hunger-pain or blood in the stools ought not to be confused with gallstones. The cases which are confusing are those duodenal cases in which the patient is comparatively free from symptoms except during the acute attacks. Such cases as No. 9 are difficult to differentiate. If they are young males the presumption is in favor of duodenal ulcer. If they are middle aged or elderly females, it is in favor of gallstones. There are seldom cases in which the pain in in relation to meals is not pretty decisive, gallstone cases being relatively more uncomfortable with the stomach full and duodenal ulcer cases with it empty. Gallstone cases will almost always have, at times, attacks of pain so severe as to be unbearable and require morphine, while with duodenal ulcer cases the persistence of daily pain for long periods, or the repetition of the acute attacks, is what makes the patient seek assistance. The individual attacks, unless perforation occurs, are bearable, and with rest and a light diet pass off. Gallstone attacks are apt to be severe for a few hours while duodenal ulcer exacerbations are subacute and last a few days. Common duct cases, or cases where there is real gallstone colic, ought never to be confused. Cases where stones are in the gall bladder that are too large to pass the cystic duct, and give chronic symptoms with spasm of the gall bladder without jaundice, are the difficult ones. In such cases the real reason of failure is generally that the physician does not think of duodenal ulcer as a possible diagnosis. In this collection of cases the fact that the stools were often not examined for occult blood is a tacit confession of this fact. There will almost always be some point which

will help. When the frequency of this disease is realized and it has become a routine to consider it in abdominal diagnosis, failure will be less frequent.

3. Appendicitis.—In acute cases of appendicitis the possibility of duodenal perforation should always be considered. If the onset is sudden and violent (almost like a bullet wound) with some shock and general abdominal rigidity, the chances are in favor of duodenal perforation. The history of previous "hunger-pain" and "sour stomach" increases this possibility, but their absence is not necessarily in favor of appendicitis. If there is tympany over the entire area of normal liver dullness, appendicitis is ruled out. In some cases of appendicitis the liver dullness is diminished from mere distension, but it is not obliterated. On the other hand, a number of cases occurred in this series to show that the presence of liver dullness may still be found where a duodenal ulcer has perforated. In other words, gas does not always escape from the perforation.

When the surgeon opens the abdomen and finds clots of mucus or food in the abdominal cavity, he may look for gastric perforation, for in duodenal perforation only fluid is the rule. Gastric perforations are usually accompanied by more shock, and often have pronounced previous gastric symptoms.

Both gastric and duodenal perforations have a concave, board-like abdomen, with general, poorly localized tenderness, when seen in the first twenty-four hours, while appendicitis cases are more apt to be distended and convex with well localized tenderness. I have previously stated that duodenal perforations are twice as common as gastric, and that every surgeon is likely to meet, at least, one to every forty cases of appendicitis. My own proportion has been about 1-16 in my last one hundred cases.

The diagnosis of chronic appendicitis is more difficult. Alleged chronic appendices are daily being removed in this country when the real diagnosis is renal or ureteral stone,

duodenal ulcer, gallstones or lesions of the pelvic organs, etc. The pendulum of consent to this practice has swung too far, owing to the comparative safety of the operation. The real justification for this operation is that the patient has been observed to suffer one or more attacks of inflammation of the appendix accompanied by fever and the classical signs. The practitioner and the surgical consultant often, however, agree in recommending appendectomy in cases of digestive disturbance or abdominal pain, even where no typical attacks of appendicitis, in the true meaning of the word, have occurred. The patient, even if his symptoms are not entirely relieved, has, at least, the satisfaction of thinking that a dangerous and useless organ had been removed. In those doubtful cases of appendicitis, where improvement in the regularity of the bowels, hyperacidity and indigestion are expected from the operation, the diagnosis of ulcer of the duodenum should be considered. The real difficulty is that as a profession, we are exaggerating the importance of the appendix and neglecting the importance of the pylorus.

In the paper to which I have so many times alluded today, I have given what seems to me pretty good evidence to show that duodenal ulcer is nearly as common as acute appendicitis. If one out of every one hundred cases dying from all causes, and autopsied at the Massachusetts General Hospital in the last twelve years, have had a typical deep open ulcer in the duodenum, it shows that the disease is common enough to be considered in every case of abdominal pain.

Gentlemen, every man whose life is miserable from a painful dyspepsia has a right to abdominal exploration if he desires it. I believe it is your duty to let him know that there is a surgical side to this question, even if you are doubtful of surgical results yourself.

POSTSCRIPT.

For the benefit of those readers who have not seen my previous publications on the Duodenum, the following Resumé is presented:

1. That in the development of mammals the large intestine has swung across the small.

2. That thus necessarily the whole blood supply of the small intestine and most of the large must cross the small intestine.

3. That this crossing place occurs at the end of the duodenum, beneath the superior mesenteric artery.

4. That in horizontal quadrupeds no obstruction is produced at this point.

5. That in vertical man a greater or less obstruction must necessarily be thus produced.

6. That as a result of this obstruction in man, the secretions of pancreas and liver may at times be thrown backward on the first part of the duodenum.

7. That the first part of the duodenum is unfitted to withstand long continued action of these secretions, since its mucous membrane is histologically and developmentally different from the rest of the duodenum, and is more closely allied to that of the stomach.

8. That the action of these caustic secretions on this unprepared mucous membrane may give rise to irritation accompanied by certain painful sensations.

9. That such sensations may be felt in the epigastrium and attributed to the stomach.

10. That long-continued action of this kind may, under certain conditions, lead to erosion and even deep ulceration of the mucous membrane just below the pylorus.

11. That such ulcerations when they are close enough to the pylorus lie in the folds of mucous membrane just outside it and are comparable to fissures of the anus.

12. That like fissures of the anus they are kept from healing by their relation to the sphincter.

13. That clinically hunger-pain and dyspepsia are the primary symptoms of such ulcers or fissures, and certain other clinical phenomena are secondary symptoms.

14. These secondary clinical phenomena or accidents of the disease are:

a. The well known acute exacerbations of duodenal ulcer cases, when there is a temporary, absorbable, inflammatory swelling of the tissues about the crater of the ulcer, causing increase of pain, tenderness and the signs of temporary interference with the pylorus.

b. The so-called stenosis of the pylorus, when these acute attacks of inflammatory deposit have left enough cicatricial residue to actually obstruct the passage of food, even after rest and careful diet have allowed the inflammatory swelling to subside.

c. The complication of hemorrhage, which is due to the accident of situation; *i. e.*, whether or not the ulcer happens to be over a large artery.

d. The complication of perforation, depending on whether the ulcer happens to be anatomically on the free side of the duodenum or on the retro-peritoneal side.

15. That in the diagnosis of these cases mistakes are made by too great consideration of these secondary accidental symptoms and too little attention to the primary insignificant hunger-pain and indigestion.

16. That when these considerations are taken into account the diagnosis is really not difficult in the advanced cases.

17. That many cases of intractable dyspepsia, which never have these secondary accidental symptoms, are really due to duodenal ulcer.

18. That ulcer below the pylorus is more common than it is above, and in future we must make diagnoses of duodenal or possibly gastric ulcer instead of the vice versa.

19. That duodenal ulcer is nearly as common as acute appendicitis.

These statements are supported by the following evidence:

1. An examination of Dr. Wright's autopsy records at the Massachusetts General Hospital shows that:

a. Duodenal ulcers occur invariably so close to the pylorus that they must lie in the folds of mucous membrane when the sphincter is contracted.

b. If they are multiple they are in the form of a ring, each in the same relation to the pylorus. They may extend or coalesce to form an encircling ulcer.

c. In nearly three thousand autopsies an open duodenal ulcer was present, whatever the cause of death, in over one in every hundred cases.

d. Duodenal ulcer occurs twice as frequently as true gastric ulcer.

e. Cases characterized by hemorrhage show a large artery in the base.

f. No scars of duodenal ulcers have been found in three thousand cases, unless an active ulcer was present, and then it could only be demonstrated by microscopical section.

g. Scars left by round ulcers of the duodenum are not noticeable because the mucous membrane is replaced over them, glands and all. Microscopically they are recognizable by a cicatricial gap in the muscle layers.

h. Therefore the absence of scars at autopsy is no argument against the frequency of the disease, and is indeed in favor of it.

2. From a consideration of the clinical records I find that:

a. Duodenal perforation is from 1-20th to 1-40th as common as acute appendicitis.

b. That two of every three cases of so-called "gastric perforation" are really duodenal.

c. That two of every three cases diagnosed as "gastric ulcers" are really duodenal, and a far greater number than this of those diagnosed as pyloric obstruction.

d. That chronic cases complaining of hunger-pain and subject to recurring attacks of temporary interference with the pylorus, should be considered cases of duodenal ulcer.

Abstracts of Histories and Autopsy Reports of fifty Cases of Duodenal Ulcer in which the Diagnosis was confirmed by either Autopsy or Operation. These include all such cases which were thus proved at the Massachusetts General Hospital from January 1st, 1897, to July 1st, 1909.

The first twelve were personal cases; the rest were in the care of other surgeons.

Case 1.—I report this case in full because it is very typical and because it presents the clinical signs of subphrenic abscess, which is such a common complication in these cases.

L. T. M. Age 37. M. Butcher. August 23d, 1903. M. G. H. Records. Vol. 450, p. 209.

The patient was a man of 37, who, except for his acute symptoms, was in splendid condition for operation. His muscular development and the amount of his subcutaneous fat were ideal for an active man in the prime of life. Until the present attack he had considered himself perfectly well, but on close questioning he admitted that he had had what he supposed was dyspepsia for several weeks or perhaps more. He had sometimes had pain an hour or two after his meals. He had never vomited before the present attack, nor had he noticed bloody or tarry stools.

From Dr. Tinkham of East Weymouth I obtained the following history of the present attack. At about 5 P.M. on the previous day, while at Nantasket Beach, the patient had been attacked by sudden severe pain in the pit of the stomach. He had vomited several times then, but not since. He was seen by a physician, who relieved him with morphine, and the following morning sent him in an ambulance to East Weymouth. Dr. Tinkham, who was then called, recognized the gravity of the situation, and at once arranged to have him sent to the hospital. He arrived at the Accident Room by ambulance from Weymouth at about 9 P.M., nearly twenty-eight hours after the initial pain.

When I saw him he was still somewhat narcotized, but in considerable pain. T. 102.5, P. 120, R. 30, leucocytes 50,000. The pulse, though rapid, was fair. The respiration was noticeably labored, though the heart and lungs were negative.

His abdomen was not greatly distended, rather concave than convex, and of almost uniform tenderness and rigidity. Though rigid and tender throughout, the upper right hand quadrant was a degree more fixed and tender than the lower. Percussion was irregularly dull in the flanks and singularly tympanitic over the normal area of liver dullness. Rectal examination was negative. (The bowels had not moved, although several enemata had been given.)

Favoring appendicitis, but being prepared for gastric ulcer, I made a high rectus incision, through which both regions could be explored. The abdomen was full of pus. I noticed no escape of gas on opening the peritoneum, and at once examined the appendix. Its appearance, while inflamed, merely suggested involvement in the general peritonitis, to which it evidently bore no causal relation. To be sure, I removed it, and Dr. Jones, who kindly examined it for me, could find no perforation. I next explored towards the stomach, and thought I noticed the escape of some gas, though I could not be sure that I had not introduced it through the wound. As the anterior aspect of the stomach was normal, I next rapidly ran over the large and small intestine, sponging out a large quantity of pus and soup-like fluid as I did so, and keeping a Tait tube flushing the pelvis with salt solution. Coming back to the gall-bladder I found patches of lymph on the pyloric end of the stomach, and while seaching for a perforation I distinctly heard the escape of gas, and found that this region kept rapidly filling with a brownish fluid containing streaks of bile. Had it not been for this guide, I think that I should have missed the ulcer, for not having perforation of the duodenum in mind, I should have spent much valuable time in examining again the posterior wall of the stomach.

Even after finding the perforation I had the greatest difficulty in closing it. It was situated on the anterior part of the duodenum, at the base of that portion of the gastro-hepatic omentum which forms the anterior edge of the foramen of Winslow. The perforation itself was about the size of a slate pencil, but an area about it perhaps the size of a five cent piece was somewhat indurated and œdematous so that it was too unyielding to invert with stitches. I therefore had to use the edge of the gastro-hepatic omentum to cover the perforation. Superficial stitches in this tore out, but the urgency of the case demanded deep stitches. I think they must have held in the common duct or the fibrous tissue about it. Five or six silk stitches were thus placed.

The abdomen was then again thoroughly flushed with salt solution, with particular attention to the region above and about the liver. The wound was partially closed with cigarette wicks to the region of ulcer, flank and appendix.

To my surprise the patient pulled through, and on the tenth day his pulse, temperature and respiration were normal. He was kept on enemata for twelve days. During the next week, however, his chart showed a steady rise; on the seventeenth day temp. 102, p. 100, r. 28. Nothing could be found to account for this except two stitch abscesses, which did not seem a sufficient cause. There was no localized tenderness or spasm, and the abdomen appeared normal except for the wounds, which were draining well. There was no cough or marked increase in the rate of respiration to call

attention to the lungs, but for three successive days it seemed to me that the liver dullness came higher and higher in the chest.

A consultation with Dr. Minot was held and the following results noted.

The abdomen offered no indication of subphrenic abscess; i. e., the region on the right below the ribs was normal, concave, and not tender. In the right chest, however, flatness, bronchial breathing and increased vocal fremitus indicated consolidation. To Dr. Minot it seemed probable that there was pneumonic consolidation in the lower lobe, and between this and the diaphragm an area filled with fluid or pus. He advised aspiration, which I accordingly did in the eighth inter-space in the posterior axillary line. Pus was obtained, and immediately after, under ether, I made an incision at the same point and evacuated a large amount of pus, as if from an empyema. After excising about an inch of rib for better drainage, I put my finger into the large cavity and could feel, as I supposed, below the convex surface of the diaphragm, and above the concave surface of what I took to be adherent lung. As a matter of fact, the liver was below and the diaphragm was above, for on turning the patient to better wash the cavity the adherent diaphragmatic and parietal pleura suddenly broke apart and air and pus rushed into the pleural cavity; the lung collapsed, leaving the diaphragm like a flapping sail between the pleural and the abscess cavity. After washing both thoroughly with salt solution, I endeavored to close off the pleural cavity by gauze packing and drained the subdiaphragmatic space with tubes.

The patient bore the operation well, but was quite cyanotic during the night. In the morning his condition seemed fair, but distinctly worse than the night before. His face was anxious with the peritonitic expression. After dressing his chest wound, I found that his abdomen was distended and somewhat tender, though he complained of no pain in it. There was, however, marked rigidity of the muscles, so characteristic of peritonitis. I came to the conclusion that in my manipulations of the subdiaphragmatic abscess I must have ruptured it on the abdominal side and by syringing spread the contents through the abdomen. It seemed that there was one possible chance of making an early diagnosis of this and once more flushing out the abdominal cavity. After giving it a careful study, I explored the left side of the abdomen under cocaine in the semilunar line. I found the abdomen full of creamy pus. Giving the patient a little ether, I enlarged the incision and washed out the whole peritoneal cavity, except that part walled off by adhesions, thoroughly with salt solution, and, having put cigarette wicks in the splenic, pyloric and pelvic regions, partially closed my incision.

For five days after this the patient was in a very critical condition, barely able to stand the dressings which were necessary to

remove the immense quantity of discharge from his peritoneum, pleura and subdiaphragmatic space.

On the seventh day, i. e., just a month after the original operation, he seemed to be fairly out of the woods, when his temperature began to rise again. For several days the same rise continued without pain or demonstrable local tenderness. On the tenth day a doughy mass hardly distinguishable from the right kidney began to appear, and by the fourteenth day was so well marked that I decided to explore it.

Under cocaine, I made an incision in the flank, and, to my dismay, entered the peritoneal cavity, behind the adherent colon. The abscess could then be felt between my finger in the flank incision and the anterior abdominal wall. It was tympanic in front and behind, due, as I afterwards found, to the ascending colon behind and to the outer side of it, and some coils of small intestine above and to the inner side of it. Following the peritoneum downward I found no pus, but on going upward toward the liver I broke into a pocket which also extended down to the right of my original wound, toward the pelvis. This I cleaned thoroughly with gauze and drained.

Between this operation and the first one the patient's bowels had been quite loose; about four movements in the twenty-four hours.

On October 4th he was improving, and went out on the veranda in a stretcher. The sinuses were doing well. On October 6th he had another attack of severe abdominal pain and symptoms of obstruction, and the surgeon in attendance explored the left side of the abdomen under cocaine. A large amount of clear fluid was found, and the transverse colon appeared the size of a lead pencil. It was considered that there must be an obstruction in the hepatic flexure, so another opening was made over the cæcum and a Mixter tube inserted. During the day there was no escape of gas or fæces from this opening, so that on the next day another operation was done, and a band was found which obstructed the small intestine. This band was removed and another Mixter tube tied into the small bowel. Following this operation the obstruction was relieved, but the patient's strength had failed to such a degree that he died on the tenth day following, about eight weeks from the time of the perforation.

Perforation	Aug. 22d, 1903.
First operation	" 23d, "
Wicks out and changed and shortened	" 27th, "
Second operation	Sept. 12th, "
Third "	" 13th, "
Fourth "	" 27th, "

Autopsy October 17th, 1903. No. 1132.

ANATOMICAL DIAGNOSIS.

General fibrino-purulent peritonitis.
Sub-phrenic abscess.
Purulent bronchitis.
Abscesses of the lungs.
Empyema.
Ulcer of the duodenum.
Œdema of the kidneys.

In the wall of the duodenum, antero-laterally and to the right, there are several strands of suture material. On the passage of water, under pressure, through the stomach and the duodenum, the sutures hold, and there is no leakage from the duodenum. On cutting the sutures and then laying the stomach and duodenum open, there is seen in the mucosa of the duodenum, at a point beneath the situation of the sutures, an ovid loss of substance about 6 mm. in greatest dimension, with smooth rounded edges and a base which is very thin and membranous in character. In the central portion of this membranous base there is a small opening about 32 mm. in greatest dimension. The mucosa of the intestines elsewhere presents nothing worthy of note.

Case 2.—Mr. M.D. Age 32. Laborer. April 3d, 1904. M. G. H. Records. Vol. 472, p. 243.

Entered the Accident Room with T. 102. P. 70. R. 35. Thirty hours before vomited and had much pain. Drank two or three glasses of beer in the morning and went to work, but felt sick with pain rather high in abdomen, which rapidly worked down on the right side and now is most severe in appendix region. Has vomited several times. Has always been well, except five years ago had severe abdominal symptoms lasting several hours. The clinical signs were typical of perforation of the duodenum or acute appendicitis.

Operation showed a much inflamed appendix which was removed and after removal examined. The mucosa was normal. Search then revealed a perforation in the anterior wall of the duodenum just below the pylorus. This was closed with silk sutures. Convalescence was normal except that it was complicated with influenza and bronchitis. In April, 1909, he writes, "I have been fairly well since you operated on me, only occasionally a pain in my side and a very bad spit."

Case 3.—Mr. R. L. Age 22. Shoe shop. Nov. 15th, 1908. M. G. H. Records. Vol. 554, p. 197.

Five days ago patient was taken with cramp-like pain in the epigastrium which persisted about the same until last night when the pain became suddenly very intense and patient vomited and had a severe chill.

At operation about thirty hours later I found the typical signs of perforated duodenal ulcer and could make the diagnosis before the incision. The condition at operation was in every way typical. On May 27th, 1908, he was examined by the surgeon on duty and the following note made: "Now states that except for occasional pain in epigastrium and constipation (more than before the operation) he has been well. Has gained about 12 pounds and been able to work. Hernia $1\frac{1}{2}''$ by $\frac{3}{4}''$ at lower end of scar. Marked impulse on coughing."

Case 4.—Mr. J. W. Age 49. December 22d, 1907. M. G. H. Records. East Surgical. Vol. 594, p. 121.

A strong muscular man in very bad shock, but evidently suffering greatly, with typical signs of violent general peritonitis. For the past three or four years has been treated for digestive disturbance by local doctor. Has never been jaundiced. Had complained of belching a good deal for the past two or three years. Had noticed each autumn pain in the epigastric region which had been severe but had never kept him from his work. Inclined to be constipated. For the past five days has suffered from pain in the same region and has vomited twice, but been able to keep at his work. This morning he had a severe sudden exacerbation of this pain, and a doctor was called who gave him morphine.

Operation fourteen hours after this sudden pain showed a perforation in the first part of the duodenum just below the pylorus with tremendous extravasation of bile stained dark colored fluid. About the region of the duodenum there were adhesions and thick pus suggesting that there had been a sub-acute perforation followed by a complete one. Patient died the next morning. The shock was so intense in this case that although diagnosis was made and the operation conducted more rapidly than usual, the pulse never recovered after the operation.

Case 5.—Mr. G. C. Age 22. Greek. Laundry work. December 26th, 1907. M. G. H. Records. East Surgical. Vol. 594, p. 145.

Never had trouble with digestion or jaundice or similar attacks of pain before. Two hours before entrance sudden sharp abdominal pain. Vomiting, contracted abdomen, etc.

Operation. Perforation in anterior wall of duodenum just below pylorus. Convalescence normal except complicated by influenza.

June, 1909. I have recently learned that this patient has returned to Greece because of sickness.

Case 6.—Mr. N. J. T. Age 18. Clerk. Private practice. Referred by Dr. N. W. Cousens. Nov. 23d, 1907.

Was always well until five or six years ago when he had "hunger pain" severely between his meals. Used to have to take

something to eat in the middle of the morning and at night before going to bed. Had "typhoid pneumonia" five years ago, etc. The night before the recent acute symptoms came on he went to bed feeling well, although during the whole week before he had a feeling of stiffness and weakness in his abdominal wall in the epigastric region; he also thought he had indigestion. Fifteen hours before I saw him he awoke about one A.M. with violent abdominal pain. He presented the picture of acute general peritonitis, and operation showed a typical perforation in the anterior wall of the first part of the duodenum just below the pylorus. The perforation was infolded. He had a normal convalescence and has remained well since.

He was heard from about June first, 1909, and stated that he was well.

CASE 7.—Mr. R. P. J. Age 38. Shoe factory. December 30th, 1907. M. G. H. Records. East Medical. Vol. 594, p. 193.

Slight, anæmic, tired-looking individual. Four years ago had a tape worm and did not get entirely rid of it for a year. Since this experience he has had attacks of epigastric pain with vomiting occurring about once in two months. These attacks are often associated with jaundice. They are apt to follow over-fatigue from work. If he rests he has no pain. Between the attacks he is troubled with sour stomach and hunger pain. Eight days ago he was seized with an especially severe pain in the epigastrium which was relieved by vomiting. Attacks of this pain occurred five times in one day. He spent the next day in bed, but worked on the third day. Pain and vomiting returned. His pain is always associated with work. Vomits greenish fluid, never blood. He was considerably jaundiced with last attack.

On examination the abdomen is not abnormal except for slight tenderness on deep pressure over the gall bladder. At operation on January 1st, 1908, a button-like area was found in the anterior wall of the duodenum just below the pylorus. It was exactly similar to the induration seen about several of the cases of perforated ulcer which I have operated on, and in every respect resembled a perforated ulcer except there was no perforation. There were light adhesions between the duodenum and gall bladder, which was normal. The ulcer seemed so surely below the pylorus that I did not do gastroenterostomy, and merely closed the abdominal wound being satisfied with having made the diagnosis certainly, and thus being prepared for proper treatment.

The patient made a good recovery and was discharged with careful directions as to diet and rest. In spite of injunctions not to work and to rest, etc., he went to work again at his business almost immediately. On February 3d, 1909, he reported that he has worked eleven hours a day practically steadily since the operation. Once in three or four weeks he has had a day or two

with poor appetite and slight nausea, but never any vomiting or severe pain. The bowels have been slightly constipated. His weight is the same. On March 16th, 1909, he wrote: "I have had good days and some quite bad ones. My stomach has bothered me some, and I have been very nervous. If there is anything the matter with me, it goes right to my stomach. A cold will settle there. I have been to business every day except three weeks since I left the hospital."

Case 8. — Mr. J. S. Age 25. Machinist. Jan. 4th, 1908. M. G. H.

A perfectly healthy looking young Irishman. Up to the fall of 1908 thinks he was perfectly well except for hunger pain in the morning at about 10.30. In fall of 1906 was working in damp basement and had pain in right side, which doctor said was sciatica. All that fall was feeling poorly, but worked. About Christmas time had attack of pain and vomiting with diarrhœa and weakness. Since then he has had recurrent attacks of epigastric pain, vomiting and tenderness.

Operation January 4th, 1908. Adhesions between gall-bladder, hepatic flexure and duodenum seemed light enough to be recent, others old. Foramen of Winslow closed. Gall-bladder normal. Mass size of button on anterior wall of duodenum just below pylorus, adherent to pancreas. (In the record it is noted as being in the second part of duodenum, but to me it seemed higher.)

I felt sure that it was far enough away not to involve the pylorus and did not do a gastroenterostomy. The laparotomy wound was closed and the patient made a normal convalescence. I have been unable to trace the ultimate result in this patient, but I know he was practically well for several months after the operation.

Case 9.—Mr. H. L. G. Age 47. Farmer and potato buyer. Private practice. Referred by Dr. M. P. Smithwick, July 25th, 1908.

A thin, sallow, almost cachetic man, of light wiry physique. Has always been very nervous. Ever since he could remember troubled with wind in his stomach, but as a boy considered himself strong and well. When a young man working in the woods lumbering, used to have heart burn severely. It would come about an hour after noon meal, and last from an hour and a half to two hours. This came, off and on, for eight years before severe attacks began. During these years he also had attacks of diarrhœa with cramps, and sometimes a little blood. For the last fifteen years, besides the sour stomach and indigestion, he has had relatively acute attacks coming on every four to five months. These attacks would last several days, and during them he occasionally vomited a "yellowish stuff." He has never seen any

blood in his vomit or stools. Pain seems in the epigastrium rather to the left than right. Thinks the pain something like a severe heart burn, only "sickisher." More cramp-like, more paroxysmal. Had used a stomach tube a great deal during last year but without real relief. There had been transient attacks of slight jaundice.

On examination by Dr. Smithwick the stomach contents were nearly normal. There was a question of slight dilatation and loss of motility. The guaiac test of both stomach washings and fæces was negative. Examination showed a distinct spasm and tenderness in the gall-bladder region, although these signs were so slight that it required a careful comparison with the other side to make them out. There was also well marked right-sided costal rigidity.

Although it seems inexcusable to me now, I considered gallstones as more probable than duodenal ulcer. As I look at it now, the history is absolutely typical, except that no blood appeared at any time in the vomitus or fæces.

On July 27th, 1908, I did a laparotomy and found an indurated area in the duodenum on the anterior wall, just below the pylorus and merging into the pancreas. Gall bladder was normal. By mobilizing the duodenum I was able to dissect the pancreas away from the induration so that I could do a Finney operation at the same time excising the ulcer. Convalescence was normal, except that during the first few days there was apparently post-operative gastro-mesenteric obstruction which was relieved by washing out the stomach. The stomach washings contained much blood.

The patient recovered well and rapidly gained in weight and strength, and the pain entirely disappeared. On May 31st, 1909, he wrote as follows: "I have been getting along fairly well. Have not had a very good appetite, and have been troubled a little with my stomach this spring. Do not feel as I did before the operation." He has gained thirty pounds, and is said by his family and friends to be in better health than he ever was before.

Case 10. F. D. M. G. H. November 15th, 1908.

This young man is a chauffeur who immediately previous to the attack had been perfectly well except for more or less constipation. We found later by careful questioning that two years before, he had had for some months "hunger pains" an hour or two before his meals. At 8 P.M., November 15th, he went to turn on a faucet in his garage and was seized by a sudden, sharp abdominal pain, which was so severe as to double him up and start a profuse sweating. Shortly after he vomited. He was taken almost immediately to the Massachusetts General Hospital, where I saw him at midnight. The pain had by this time somewhat abated, the pulse was good and his general appearance not then one of shock. The abdomen was contracted, concave, boardlike. Tenderness was greatest in the right iliac fossa, but

there was almost as much tenderness over the whole abdomen. The upper half was more rigid than the lower half, and the right half than the left half, although this difference was one of very slight degree. The liver dulness was normal. Rectal examination was negative.

Under ether a high appendix incision was made, which might allow enlargement either downward or upward. There was no gas in the abdominal cavity, but a slightly yellowish or greenish tinged clear fluid escaped when the paritoneum was opened. The cæcum was movable, but the appendix was adherent to the posterior edge of the liver and immediately over the right kidney, its base being just under the incision. It was faintly reddened and showed in one or two places adherent fibrin.

Since the appendix was not more definitely involved than the adjacent peritoneum, the incision was carried upward to the costal margin and the duodenum drawn down into the wound. The manipulations attending this destroyed recent adhesions of fibrin and as soon as the duodenum was exposed a perforation with necrotic edges and about the size of a slate pencil was seen on the anterior wall about a half inch from the pylorus. Through this opening deeply bile-stained fluid welled up under considerable tension. The stomach was distended considerably so that a stomach tube was passed and withdrew about a pint of pea-green fluid. There was a slight induration about the margin of the perforation which could be felt through the wall of the duodenum. In other respects it was not greatly inflamed or indurated.

The perforation was closed with a purse-string silk suture and infolded with an additional row of silk sutures. The abdomen was then flushed out with salt solution. The appendix, although flecked with fibrin and held high in the right upper quadrant, was not obviously abnormal. It was not removed, because the operation would have been unnecessarily prolonged. During the operation the first and second parts of the duodenum were carefully examined and were found to be considerably larger than normal. The lower part of the second portion and the third portion were not examined for fear of prolonging the operation unduly. It was noteworthy that the stomach was distended with gas and fluid, although no gas and only fluid escaped into the abdominal cavity.

At the present date he is well and free from symptoms, although for several months after the operation he was annoyed by hunger pain.

Case 11. Mr. R. W. M. Age 42. Private practice. Referred by Dr. C. O. Thompson, January 14th, 1909. Milk dealer.

A large fine looking man except for pallor and the appearance of suffering. Always was inclined to diarrhœa and stomach trouble. In childhood bowels have always moved readily and there

has been no trouble with them at any time. Usual weight 220, is now 204. At 20 had an attack of epigastric pain which confined him to bed for two weeks. This was severe and continuous and accompanied by tenderness—even moving caused pain. He had another similar milder attack a few weeks later. Has always had "belly aches" and "sour stomach." Four years ago had rheumatism in his legs and thought it went to his stomach. For two years his pain in stomach has been worse. For past three weeks has had much pain in epigastric region which begins quietly and goes to a maximum and leaves similarly. It goes through to back and left side. Comes on two to three hours after meals and is diminished by food. Small amounts diminish it for a short time, and it is less after meals. Last May after a prolonged muscular effort had several large bloody stools. Has recently been under the care of Dr. M. P. Smithwick, who made a diagnosis of duodenal ulcer and found blood in the stools. Under rest in bed and proper diet he apparently recovered completely, but on going to work again his pain has returned. His pain was relieved by soda temporarily. Recently there has been a considerable amount of blood lost by stool.

At operation on January 15th, 1909, I found a mass in the duodenum just below the pylorus and involving the latter which seemed to me about the size of an egg. It seemed to me too adherent to justify pylorectomy or pyloroplasty, and I accordingly did a posterior gastroenterostomy. Just before closing the abdominal wound I noticed that the small intestines in the neighborhood of the gastroenterostomy appeared more than naturally distended. I suspected hemorrhage from the mucus membrane of the gastroenterostomy wound, but decided to take the chances of its stopping. Within a few hours after the operation the patient vomited large amounts of almost pure blood, became collapsed, and in spite of the use of rabbit serum, rapidly became worse and died about midnight.

At autopsy the gastroenterostomy was found in perfect condition. Just below the pylorus was a duodenal ulcer one or two c.m. in diameter. In its centre the pancreatico duodenalis artery was laying exposed and with an open rent in it. The ulcer had perforated also through the wall of the intestine and was plugged on the peritoneal surface by a finger-like piece of omentum. The mass "the size of an egg" was merely inflammatory tissue capable of absorption.

Case 12. — On August 13th, 1908, I saw in consultation with Dr. Fernald of Cohasset a man of about fifty years, who was a Portuguese by birth but had lived most of his life at Cohasset. He had been well until the spring of 1908, when he called Dr. Fernald for abdominal pain which was severe enough to require morphine and confine him to bed. There was

vomiting and much abdominal rigidity and tenderness. In the course of a few days the abdominal symptoms subsided and thoracic symptoms took their place. The diagnosis of a left-sided pneumonia was made, but as the temperature persisted and the dullness did not disappear from the lower portion of the left side, Dr. Fernald suspected empyema and tapped a number of times without obtaining pus. The patient's condition continued grave and he ran a typical hectic temperature. Dr. Fernald came to the conclusion that an abscess of the lung must be the cause of the trouble. This diagnosis was made certain in July, when the patient began raising large amounts of foul smelling sputum. After this his condition began slowly to improve until the latter part of July when he was able to get out on the piazza. Although the purulent sputum, pyrexia and weakness still continued, the patient appeared to be gaining until August 11th, two days before I saw him. On this date he was suddenly seized with pain in the left leg. This was followed in a few hours by complete paralysis of the left leg and partial paralysis of the right. At the same time the pulse and temperature ran higher than before, and the patient showed a slight delirium. The abdomen became much more distended and the respiration more rapid.

The day before I saw the patient another surgeon had been called, and in the hope that the paralytic symptons might be due to a toxemia like post-diphtheritic paralysis, had done an exploratory operation on the left side of the chest, but did not succeed in establishing good drainage.

When I saw the patient he was too far gone to make operation justifiable. It seemed to me that the main symptoms were due to cerebral abscess and that the pneumonia had been caused by a subdiaphragmatic abscess which had perforated the diaphragm and eventually discharged through a bronchus. Retro-perforation of a duodenal ulcer was suggested as the original cause, although appendicitis followed by pylephebitis could not be excluded.

Autopsy by Dr. Fernald and myself on August 18th demonstrated multiple cerebral abscesses, multiple abscesses of liver, subdiaphragmatic adhesions, and in the left side the remains of a subdiaphragmatic abscess communicating through the diaphragm with the adjacent left lung and discharging through one of the bronchi.

About the duodenum the adhesions were very dense and walled off an abscess which lay behind the pancreas through most of its extent, but in the head came forward between it and the duodenum. It was difficult to be sure whether this abscess originated in the pancreatic tissue, most of which was not abnormal in appearance. Dr. Fernald thought that it was independent like the liver abscesses, but to me it seemed more like a plegmon extending behind the gland and occasionally in among the lobules. In the

head of the gland the abscess embraced the duodenum like two arms of a Y. There was no fat necrosis.

On opening the duodenum and stomach the mucous membrane was found to be normal, except for a purplish area and two cicatricial-looking areas just to the duodenal side of the pylorus. On microscopic section these areas proved to be distinct cicatrices which involved the muscular coats. A section from one was published in my recent paper.

Case 13.—Mrs. L. G. Age 39. Dec. 24th, 1897. M. G. H. Records. Vols. 21 and 23, p. 66.

Attacks of pain similar to the present one have been suffered for the last 20 years, but never so severe. She has vomited at times and had some pain in the right side. Five days ago she ate a hearty dinner, and afterwards had a heavy sensation in the epigastrium. That night she did not sleep well and vomited the next day. Vomited again on the next day, but not since. Has had general abdominal pain which has become localized in the gall-bladder region where there is an indefinite mass to be felt. Never had jaundice.

She was not operated on, and soon failed and died.

Autopsy showed both duodenal ulcer and gall-stones.

Autopsy No. 190.

ANATOMICAL DIAGNOSIS.

Round ulcer of the duodenum with hæmorrhage.
Cholelithiasis.
Arteriosclerosis.
Arteriosclerosis of kidneys.
Œdema and congestion of lungs.
Small cyst of broad ligament.

Stomach.—The mucosa reddened and the organ contains about a litre of dark fluid and clotted blood. In the duodenum just below the pylorus is a circular opening about 1 cm. in diameter, passing into the muscular coats of the intestine and with sharply defined edges. The mucosa of the intestine from the pylorus for about 50 cm. is pale, with occasional slight, reddish stains. From this point downward, through both small and large intestine, the mucosa is stained a livid red color. This is most marked about the head of the cæcum. The degree of lividity varies somewhat in different parts of the intestine. In the large, and the lower part of the small intestine, is a considerable amount of a clotted blood-like material.

Case 14.—Mr. C. H. M. Age 44. Policeman. April 7th, 1901. M. G. H. West Medical Records. Vol. 458, p. 48. South Surgical Records. Vol. 52, p. 82.

Was formerly sailor, and drank more or less when on sprees. He was operated on for stricture at the M. G. H. about 1895.

Five weeks ago caught cold, and had a cough. Began to have foul mucus rising in his throat, which got worse. One night after eating roast beef gas kept coming up from his stomach, and a burning sensation. Kept getting worse. About 2½ hours after eating would have "burning" sensation and "phlegm," had some shooting pain in the pit of the stomach, and nausea in the morning. Two weeks ago began to vomit about an hour after meals. Vomitus very sour and of a chocalate color. Had to quit work and send for a doctor, who put him on a strict diet. Got a little better, but this week has been worse again. Has vomited everything, even water, up to last night. Has lost forty pounds in six weeks. Complains chiefly of the vomiting.

Examination shows a tender point in the epigastrium three inches below ensiform. There is much splashing. Area of tympany is normal.

On March 14th, 1901, he entered the medical service, and was put on rectal feeding. There was no vomiting; his pain in epigastrium was relieved by sod. bic. On March 24th, when they gradually began to give him food, he began to vomit; when the food was omitted, the vomiting stopped. On the 13th he vomited a large quantity of coffee-like material. On April 1st an indefinite mass was felt in the epigastrium. Vomiting continued every few days, so he was transferred to the surgical side on April 7th.

At operation a mass was found in the duodenum, and an anterior gastroenterostomy was done. He died on the 16th. The post-operative history suggested a continued, slow hæmorrhage. The stomach and duodenum were removed post-mortem through the wound, and a photograph is preserved showing a typical round ulcer just below the pylorus.

Case 15.—Mr. C. A. H. Age 21. July 3d, 1901. M. G. H. South Surgical Records. Vol. 54, p. 128.

Has felt well as ever in his life up to last night. Just after going to bed, sudden severe pain in pit of stomach, accompanied with vomiting, tenderness, etc. On cross-questioning, he says that last few weeks he has had "a little sort of gnawing, uneasy feeling in epigastrium, but has had no trouble with stomach; has eaten all sorts of things freely; no belching nor vomiting nor pain after eating. No jaundice; no constipation."

On examination, there was boardlike rigidity of the abdomen. Liver dullness was normal, but "over the liver found crepitus as he breathes."

At operation a median incision was made, nothing was found; then an incision was made in the appendix region, and the appendix removed. The appendix was covered with flakes of fibrin. The abdomen was irrigated. He died 48 hours later.

Autopsy No. 718.

ANATOMICAL DIAGNOSIS.

Perforating ulcer of the duodenum.
Acute general fibrino-purulent peritonitis.
Operation wounds.

Just below the pylorus the antero-lateral portion of the wall of the duodenum is slightly adherent to the under surface of the liver by rather soft, easily separable adhesions. On separation, there is disclosed a small opening in the wall of the duodenum, just below the pylorus, from which the stomach contents exude on pressure of that organ.

Stomach.—On section, the organ is not remarkable, except for a rather large patch of ecchymosis in the mucosa.

Duodenum.—On section, there is a bulging-out appearing loss of substance in the mucosa, just below the pylorus, about 1 cm. by 7 mm. The edges of this loss of substance are rounded, fairly smooth, and are bevelled down through the wall of the duodenum as far as the peritoneal coat, in which there is a small perforation about 2 mm. in greatest diameter and which is the opening mentioned in the description of the peritoneal cavity. The remaining portion of the intestinal tract is not remarkable.

Case 16.—Mr. H. C. Age 50. Actor. December 10th, 1901. M. G. H. Records. Vol. 369, p. 148. Vol. 361, p. 74. Vol. 60, p. 62.

On September 4th, 1883, at the age of 32, he entered the hospital for typhoid. At that time he gave a history of "nervous prostration" three years before; this was associated with chills and fever, and lasted two years. He re-entered again on December 10th, 1901, at the age of 50.

At this time he gave a history of nervous dyspepsia at 27, and said that for two years he had attacks of eructations of gas, bloating and sour stomach, but no vomiting. Since this time has always had a delicate stomach, and has had to be careful of what he ate or else epigastric pain and distress would follow. In 1899 he had jaundice, which came on gradually and lasted two months. Had occasional chills, and attacks of severe knife-like pains in right hypochrondrium and radiating around abdomen. Was given olive oil treatment, and in two weeks passed three hundred and fifty stones, which his physician said were gallstones. After this he "felt splendid" for a year. During all that time (travelling about with show) subject to old stomach trouble and occasional vomiting. Since 1900 has had attacks of pain lasting one to four hours in gall-bladder region. For a year stomach has troubled him more or less from daily vomiting. Often large quantities, always with relief. Symptoms not increased by kinds of food, but he diets on "general principles." Has to use enemata. Wife has washed out his stomach daily for a year. Has taken much morphine. Half a grain a day for six months.

Examination.—Visible peristalsis and gurgling below umbilicus. Dilatation. Improved under medical treatment, but he was transferred to the surgical side December 25th.

January 2d, operation. Gall-bladder was found normal. Stomach very large. Pylorus and duodenum surrounded by dense adhesions. Pyloroplasty. Pneumonia developed, and he died on the seventh day after the operation.

At autopsy the gall-bladder was found normal, and a duodenal ulcer was present.

Autopsy No. 808.

ANATOMICAL DIAGNOSIS.

Lobar pneumonia of the left upper lobe.
Ulcer of the duodenum.
Gastroptosis.
Chronic peritonitis in the region of the pylorus, duodenum and gall-bladder.
Chronic perihepatitis.
Pyloroplasty.
Small calcareous patch in the aorta.
Deformed liver.
Pseudo-pneumococcus septicæmia.

Stomach.—Considerably enlarged, and hangs several cm. below its normal position. On section, the wall at the pyloric end is somewhat thickened, and in the region of the pylorus presents a row of intact sutures. Several intact sutures in the mass of adhesions mentioned above. The mucosa of the wall of the duodenum, just below the pylorus, shows one or two thickened folds, and just immediately below the margin of the pylorus there is an ovoid loss in its substance, measuring 1½ cm. in greatest diameter, which diameter is parallel with the longitudinal axis of the first portion of the duodenum. This loss in the wall of the duodenum has smooth rounded edges which are bevelled down to a smooth base, which is dense and gray white in appearance. Section at right angles to the long diameter of the ulcer shows its base to consist of a narrow band of dense gray white tissue, immediately beneath which is the pancreas. The pylorus permits the passage of the little finger through its lumen.

Case 17.—Miss C. T. Age 20. Clinical record not obtained. Nov. 18th, 1901. M. G. H.

Autopsy No. 775.

ANATOMICAL DIAGNOSIS.

Chronic glomerulo-nephritis.
Hypertrophy and dilatation of the heart.
Chronic passive congestion of the lungs, liver and spleen.
Hydropericardium.

Ascites.
Anasarca.
Ulcers of the duodenum.
Chronic pelvic peritonitis.
Some fatty degeneration of the myocardium.

The mucosa of the duodenum presents two losses of its substance, measuring about 1 cm. in greatest diameter. One of them is shallow with bevelled edges and smooth base. The other apparently extends to the muscular coat and presents bevelled edges and a smooth base. The remaining portion of the intestine, on section, is not remarkable, except for a general reddening of the mucosa.

Case 18.—Mr. H. L. Age 69. Baker. February 24th, 1902. M. G. H. South Surgical Records. Vol. 60, p. 246.

Brought to the Accident Room with a crushed arm and chest. Hæmorrhage necessitated ligatures of sub-clavian artery. There were various complications, and he died on the ninth day. There is no mention of stomach symptoms in his history. Autopsy No. 840.

ANATOMICAL DIAGNOSIS.

Ulcer of the duodenum, with rupture of a large artery at its base, and with hæmorrhage into the duodenum and stomach.
General anæmia.
Fracture of the scapula, clavicle and ribs on the left side.
Amputation of the left arm at the shoulder joint.
Suppurating wound of the left shoulder.
Hydrocele (double).
Nephrolithiasis and chronic interstitial nephritis of the right kidney.
Hypertrophy of the left kidney.
Streptococcus infection.

Stomach.—Rather large and somewhat distended. The duodenum is distended to about the size of the fist. The walls of the duodenum and of the stomach show a dull red color, as if from material in their cavities, the color of which shows through the walls. On section, the cavity of the duodenum is filled with a dark red blood clot and a small amount of fluid blood-like material. The cavity of the stomach contains a dark red clot measuring roughly about 30 cm. long by 8 cm. wide by 5 cm. thick, and a moderate amount of fluid blood-like material. The mucosa of the stomach is not remarkable. About 1½ cm. below the pylorus and posteriorly in the wall of the duodenum there is a loss of substance measuring 2½ cm. in greatest dimension. The edges of this loss of substance are overhanging in places, and in other places are rounded and fairly smooth. The base of the ulcer is about

2½ cm. in greatest diameter, its surface firm, somewhat fibrous and slightly trabeculated. On section, through the base, the pancreas is seen to be in close relation with the floor of the ulcer. In the upper part of the base of the ulcer a grayish black red mass about 6 mm. in greatest diameter. This mass is apparently blood clot. On further dissection a rather large artery is seen extending across beneath the floor of the ulcer, and at the point of the situation of the small mass described as in the upper part of the floor of the ulcer there is a loss in the continuity of the vessel walls through which opening the small mass mentioned extends iuto the lumen of the artery.

Case 19.—Mrs. M. S. Age 60. Laundress. March 10th, 1902. M. G. H. Records. Vol. 391, p. 184.

Came to the hospital on account of gangrene of the legs. Both legs were amputated. There was no stomach history. Autopsy No. 861.

ANATOMICAL DIAGNOSIS.

Athomatous endocarditis (mitral stenosis).
Hypertrophy and dilatation of the left auricle.
Thrombosis of the left auricular appendix.
Embolic thrombosis of the right axillary artery.
Hæmorrhages into the basal ganglia on the side.
Multiple infarcts of the spleen and kidneys.
Double amputation at the lower third of the thighs for embolic gangrene.
Obturating thrombosis of the left common iliac and external iliac veins.
Infarcts in the left lung.
Ulcer of the duodenum.
Hæmorrhage into the small intestine.
Malformation of the left common iliac vein.
Chronic perihepatitis.
Cholelithiasis.
Streptococcus infection.

The duodenum near the pylorus is attached to the gall bladder by connective tissue adhesions, which are of a dark brown color, over an area about 1½ cm. in diameter. Through the central portion of this dark brown area, between the duodenum and the gall-bladder, in the midst of these adhesions, there exudes on slight pressure a foul brown-colored fecal fluid. It is almost certain that a perforation had not existed at this point until made during the manipulation of the autopsy.

On opening the duodenum, there is seen to be an irregular-shaped defect in the wall of the duodenum at a point corresponding to this area of adhesions of the duodenum to the gall-bladder. This opening in the wall of the duodenum is likewise in direct

continuity with the opening already mentioned through which fecal material exuded on pressure. The opening in the wall of the duodenum is about 1 cm. in greatest diameter. The mucous membrane rounds over its margins. The margins are not especially indurated, nor is there any extensive thickening of the wall of the gut about this opening. The opening is situated about 12 mm. below the pylorus.

The mucous membrane of the gall-bladder presents no sign of inflammation, and there is no evidence that the perforation of the wall of the duodenum is due to inflammation of the gall-bladder. In the small intestine a considerable quantity of thin purplish-colored opaque fluid, paint-like in character. This is regarded as the result of hæmorrhage into the intestine, which has produced the reddish coloration of the wall of the intestine above noted.

Case 20.—Mr. J. W. Age 28. Insurance Agent. May 22d, 1902. M. G. H. Records. Vol. 62, p. 199.

Was brought to the Accident Room with bullet wound of the stomach, having attempted suicide. He died on the eighth day after operation.

Autopsy showed that a duodenal ulcer was present beside the recent wounds.

Autopsy No. 879.

ANATOMICAL DIAGNOSIS.

Partially healed and healed wounds of the left thoracic wall, the diaphragm, the liver, the stomach and the tissues of the back about the 12th thoracic vertebra with unclosed perforation of the stomach wall, said to be due to the passage of a bullet.

General fibrino-purulent peritonitis.

Hæmorrhagic œdema of the lungs.

Parenchymatous hæmorrhage in the lower lobe of the left lung.

Chronic perisplenitis.

Ulcer of the duodenum.

Laparotomy wound.

Streptococcus septicæmia.

After describing the bullet wounds of stomach, etc., the following statement is made: In the duodenum, just below the pylorus, a loss of substance in the wall of the duodenum about 8 mm. in greatest diameter with rounded bevelled edges and a smooth base. The loss of substance extends as far as the outer coat of the duodenum. The intestines, on section, elsewhere show marked post-mortem changes. No lesions observed.

Case 21.—Mr. J. D. Age 47. Ironmoulder. August 7th, 1902. M. G. H. East Medical Records. Vol. 569, p. 182. East Surgical Records. Vol. 414, p. 205.

Until seven years ago had never been sick, except for constipation and hæmorrhoids. Has used no liquor for nineteen years.

Seven years ago he began to lose flesh. Used to weigh 185; now 158. Nine months ago had sour stomach, and vomited two or three times daily for several weeks. Was treated by having stomach washed, etc. Gained flesh, and was well until twelve days ago, when he began to get weak again, and became paler. For five days noticed tarry stools, and again yesterday. Has been very restless, and sweats easily. Very pale, and in very bad condition for surgical operation. An indefinite mass felt in region of gall-bladder.

Operation was nevertheless attempted on August 8th, but the patient died soon afterwards.

Autopsy No. 912.

ANATOMICAL DIAGNOSIS.

Ulcer of the duodenum with perforation of the common bile duct and of an artery at the base of the ulcer with extensive hæmorrhage into the intestine.

General anæmia.

Laparotomy wound.

Streptococcus and pneumococcus infection.

The stomach, just above the pylorus, is encircled by a ligature. There is a complete separation in the continuity of the duodenum a short distance below the duodenal papilla, and the proximal end of the separation is closed by a row of sutures, which are intact. The distal end is open. The stomach, on section, presents a normal mucosa. The duodenum, on section, presents in its wall, just below the pylorus, a deep loss of its substance, measuring 2 cm. in greatest diameter. The edges of this excavation are generally rounded and fairly smooth, but its lower margin, for a distance of $1\frac{1}{2}$ cm., is flattened and bevelled fairly smooth with the floor of the ulcer. The common bile duct, which runs close to the ulcer, presents an extensive loss in the continuity of its walls, so much so that on pressure on the gall-bladder the bile flows into the ulcer. All that remains of the distal end of the common duct is a small portion about 1 cm. long, which opens continuously through the duodenal papilla. In the base of the ulcer a minute dark red clotted mass resting in the broken wall of a good-sized artery, which, on section, is seen extending across and just beneath the floor of the ulcer. There is some fibrous thickening in the floor of the ulcer, which is in immediate association with the tissue of the pancreas.

Intestines, on section, contain a large amount of tarry black red semi-fluid blood-like material.

Case 22. — Mrs. M. G. H. Age 68. May 12th, 1903. M. G. H. Records. Vol. 586, p. 14.

"Ever since last November she has had indigestion with loss of appetite and sour stomach. Almost daily vomiting. This has

continued without noticeable improvement or increase all through winter up to present. Vomiting occurs every fifteen minutes to one hour after eating. Amount of vomitus small, sour; no coffee grounds. She feels tired most of the time. No headaches or vertigo. No loss of memory. She has occasionally been in bed a day or two on account of weakness, but as a rule is up and about."

In spite of this pretty clear history, the Hospital Records go on to state that the patient behaves in a demented manner, and gives other symptoms of mental deterioration.

A diagnosis of melancholia was made. There was a slight fever and abdominal symptoms, and the patient died after being in the hospital a few days.

Autopsy No. 1064.

ANATOMICAL DIAGNOSIS.

Ulcers of the duodenum.
Arteriosclerosis of the aorta and its great branches.
Slight atheromatous endocarditis of the mitral and aortic valves.
Chronic mastitis.
Chronic perihepatitis.
Calcareous fibroma of the uterus.
Old scar in the skin over the left breast.

The duodenum, on section, presents in its mucosa two losses in its substance roughly triangular in shape, the larger one measuring 2 cm. in greatest length and 1 cm. in greatest width. The smaller and more irregular one measures 1 cm. in greatest length and about 7 mm. in greatest width. The edges of the larger are rounded and overhanging, and the ulceration extends into the muscular coat. Its base is smooth. There is a slight streak of fibrous tissue just beneath the base of the ulcer. The pyloric ridge forms a portion of the upper boundary of the ulcer, which is situated in the posterior wall of the duodenum. A smaller ulcer is situated in the anterior wall of the duodenum with a small portion of its upper boundary formed by the pyloric ridge. Its edges are rounded, irregular and overhanging, and it extends through the wall of the duodenum, forming in the wall of the duodenum viewed outwardly a small opening with slightly irregular edges about 6 mm. long by 2 mm. wide. The peritoneum, in the neighborhood of the opening, is blackish, fairly smooth, and no definite adhesions are demonstrable. The tissue of the margins of the walls at the base of the ulcer are blackish and slightly disintegrated.

There are no duodenal contents in the peritoneal cavity, and the perforation is regarded as being due to post mortem change.

The intestines elsewhere on section show nothing remarkable, except that the mucosa is rather generally reddened, and in the

lower part of the small intestine and upper part of the large intestine, the contents consists of a rather thin brownish red semi-fluid material.

Case 23.—Mr. P. F. B. Age 29. Printer, and later bar tender. May 12th, 1903. M. G. H. Records. South Surgical. Vol. 153, p 215. West Medical. Vol. 588, p. 6. South Surgical. Vol. 136, p. 293.

Has abused alcohol, but has had no trouble with stomach and has never been sick before this. Three days ago he noticed slight dizziness and shortness of breath. Had a dark stool. In the afternoon he vomited some dark blood. Has vomited more or less since, but has had no pain in stomach or abdomen either after eating or in connection with vomiting. Black movements daily. Four days ago he was treated at the Out-Patient Department for piles. The last six weeks he has had pain in left shoulder on lying down. It was worse on deep breathing, and bore no relation to the time of eating. For two years has had slight cough and occasional night sweats. Very pale. Reds 1,776,000. Put on rectal feeding. Steady improvement until June 10th, when he was discharged well.

On November 13th, 1906, he was brought in with typical symptoms of acute perforation. He had remained well since his discharge from the hospital until ten hours ago. At operation a perforation in the first part of the duodenum was found and sutured, and a bit of omentum drawn over it. The convalescence was smooth except for a pocket in the region of the right kidney, and at one time symptoms of a subphrenic abscess, when he was aspirated, but nothing was found.

On January 24th, 1907, he was discharged to the Out-Patient Department. He re-entered again on October 19th, 1907, with a history that he had remained well until two days ago when he began to vomit. This vomiting was not preceded by pain, and was greenish.

Examination: "a thin, straight-forward Irishman." Abdominal wall thin and peristalsis visible. No tender point or mass. Splashing in flanks. Temperature normal. Did not consent to operation until following day, when a laparotomy was done and intestinal obstruction found. Intestinal obstruction due to a band which had caused constriction of the intestines with a partial volvulus found. In freeing this the jejunum was apparently torn, and the patient died of general peritoniatis.

Two days later, in the careful autopsy record, No. 2034, there is no mention of a scar in the duodenum, and yet it states that the mucosa of the intestines was normal.

Case 24.—Mr. L. W. P. Age 50. Shoe Store. October 28th, 1903. M. G. H. Records. East Medical. Vol. 474, p. 5. Vol. 603, p. 104. Vol. 593, p. 100.

First note at the hospital is on October 28th, 1903. He then stated that he had had stomach trouble for past 25 years. The last 15 months had been getting worse. Most distressing symptoms were pain in the stomach at night, gas in the stomach and bowels, and frequently vomiting "during distress spells," which usually occurred every week or so. Vomits from a quart to a pint yeasty sour material. Has seen such things as peas and blueberries in vomitus when he had not eaten them for several days. Four weeks ago passed a mucus cast by rectum 18″ long. Was jaundiced for a whole year between July, 1902, and July, 1903 Two weeks ago he passed a pint of brown-black liquid fæces. Has never vomited blood or passed it by rectum. Has lost 17 pounds during the last year. Has passed a number of mucus casts. Examination negative except for visible peristalsis. Gurgling and splashing. No blood in stomach contents.

Treated in Medical Wards by stomach washing and frequent feeding, so that on November 8th he said he felt better than he had for two years. There was evident dilatation, and the residue varied but tended to diminish. On December 12th he was sent home relieved, but not well, and to consider operation. The diagnosis was dilatation and ptosis of the stomach.

He returned on April 1st, 1904. "Since leaving the hospital has been fairly comfortable and improved considerably, gaining 26 pounds. For the first three weeks washed his stomach out daily, and has continued to do so at intervals since."

On April 16th a laparotomy was done, "stomach somewhat dilated, large plexus on greater curvature, marked cicatrization with adhesion in pyloric region; pylorus not patent to finger invaginating stomach wall." A 16″ loop anterior gastroenterostomy was done with a bone bobbin. A vicious circle followed.

Autopsy No. 1205, April 26th, 1904.

ANATOMICAL DIAGNOSIS.

General fibrino-purulent peritonitis.
Ulcer of the duodenum.
Slight fibrous endocarditis of the mitral valve.
Slight atheromatous endocarditis of the aortic valve.
Gastroenterostomy.
Streptococcus septicæmia.
Arteriosclerotic degeneration of the kidneys.

At a point about 25 cm. from the commencement of the jejunum there is an anastomosis established between the stomach and the jejunum. The anastomosis is situated in the lower portion of the anterior wall of the stomach, a little above the median line of the greater curvature and 14 cm. from the pylorus. The anastomosis is tight to water under tap pressure. The outer row of sutures between the jejunum and the stomach in the situation of the anastomosis presents here and there minute collections of pus.

The pus in these situations generally does not extend for any distance into the tissues, but at one point there is a small pocket of pus which extends a short distance into the tissues. The wall of the jejunum at this place shows a small, rather sharply defined, area to which purulent material is adherent. The purulent material is present in well marked amounts among the coils of the first portion of the jejunum. In making the anastomosis the jejunum is brought up over the transverse colon.

The stomach is not enlarged, but, on the contrary, is more or less contracted down. On section, the mucosa shows well-developed rugæ and otherwise is not remarkable.

The communicating opening between the stomach and the jejunum is about 3.5 cm. in greatest diameter, and easily admits the passage of the middle finger. The pylorus is small and barely admits the passage of the closed blades of a small pair of scissors. The duodenum, on section, contains very little material, and its mucosa is not remarkable, except that at a point just below the pylorus, posteriorly and laterally to the right, there is an irregular rather deep loss of substance about 1.5 cm. in greatest dimension. The margins of this ulcer are considerably undermined, and the margins of the base extend into the wall of the duodenum from 2 to 5 mm. beyond the edges of the opening, giving to the ulcer a pocket-like structure. The base of the ulcer is fairly smooth, but in one or two places presents small blind, dimple-like depressions. There is some fibrous thickening in the tissues at the base of the ulcer, and the common bile duct extends across immediately beneath it, but is not involved, and there is no evidence anywhere of perforation of the ulcer.

Case 25.—Mr. W. P. P. Age 42. Clerk. April 2d, 1904. M. G. H. Records. East Medical. Vol. 472, p. 237. Vol. 603, p. 80.

Has had stomach trouble, with dyspepsia and gas, for seven years. Worst in last six months. Has been treated in Out-Patient Department for gastric dilatation and hypoacidity (hyper). Uses the stomach tube himself. This morning at 9 o'clock was taken with sudden severe pain in epigastrium, vomited, etc.

A laparotomy was done. "Stomach lay beneath opening, and on its anterior aspect, close to the pylorus, was a perforation about $\frac{1}{4}$" in diameter. Beneath this perforation in the stomach a firm mass was felt, size of an egg, situated close to pylorus. Mass thought to be cancer." An enterostomy was done and the region of the perforation drained. The patient died on the thirty-ninth day, apparently from sub-diaphragmatic abscess. The ulcer was in the duodenum. Autopsy No. 1213.

ANATOMICAL DIAGNOSIS.

Sub-diaphragmatic abscess.
Abscess of the lower lobe of the right lung.

Arteriosclerosis of the abdominal aorta.
Cholelithiasis.
Obsolete tuberculosis of apical pleuræ.
Ulcer of duodenum.
Laparotomy wounds, one of which communicates with the jejunum.
Skin graft.
(Operation in this case for perforation thought to be in stomach.)

Stomach large, and its anterior wall a short distance above the pylorus is firmly adherent to the abdominal wall at the base of the wound in the median line of this wall previously mentioned. The anterior margin of the right lobe of the liver presents some fibrous adhesions to the anterior abdominal wall in this region. On section, the mucosa of the stomach shows nothing worthy of note. The duodenum, on section, presents at its upper portion, immediately below the pyloric ridge which is well marked, two parallel thickened lip-like folds of mucosa, which extend around the wall and situated between which there is a smooth grayish fibrous band-like depressed area about 1 cm. in greatest width. This area narrows to a point in the wall of the duodenum, just below the pylorus, at which point there is a small scar-like depression in the outer surface of the duodenal wall with faint radiating scar-like lines extending through the fibrous-like area, which is situated anteriorly and laterally to the right in the wall of the duodenum.

Case 26.—Mr. E. H. Age 49. May 20th, 1904. M. G. H. Records. South Surgical. Vol. 97, p. 15.

Previous history not given. "Three weeks ago began to have considerable indigestion of a rather definite sort, accompanied by some pain and distress in the epigastrium, which radiated down into both loins. Has noticed nothing abnormal about stools. Has never vomited until yesterday morning. Night before last he was taken with a sudden, very severe, sharp pain, chiefly in epigastric region, but which also radiated towards flanks. The abdomen was rigid and tender in the right upper quadrant."

Operation.—On opening the peritoneum no free fluid, but omentum and intestines found matted together over gall-bladder region, localized abscess in flank and perforated duodenal ulcer. Ulcer infolded with chromic catgut and reinforced with omentum. Convalescence normal.

Case 27.—Mr. E. P. D. Age 24. Book-keeper. May 30th, 1904. M. G. H. Records. West Surgical. Vol. 471, p. 81.

Never had similar attack before present one, but had "indigestion" for three years. Two days ago sudden pain in epigas-

trium, which has been continuous and severe since. Diagnosis supposed to be appendicitis, and the appendix was removed, but appeared normal. Second incision was made from the ensiform to the umbilicus. Perforation in the anterior wall of the duodenum just below the pylorus closed. Good convalescence.

Case 28.—Mr. W. A. P. Age 33. Mill hand. Dec. 17th, 1904. M. G. H. Records. Vol. 494, p. 26.

Has always had good health until eight years ago, when he was seized with sudden acute pain in abdomen. Fainted, and was unconscious for over an hour. After this was sick abed for one week with nausea and vomiting. Since then patient has had several attacks at irregular intervals and of same nature. No exciting cause known. In this time has vomited blood on four different occasions, and once or twice blood has poured freely into mouth from below. Pain is sometimes dull, sometimes sharp, and has been in different parts of the abdomen, but of late is localized to left side. Pain sometimes comes on shortly after eating, but is mostly without relation to food. Stools have often been dark and have contained what resembled clotted blood. Patient has been unable to work steadily because of pain and weakness. No marked loss of weight. Of late pain has been worse. Bowels regular.

Examination.—Abdomen flat, tympanitic, soft. Just to left of umbilicus, under the left rectus, is felt an indefinite solid mass size of hen's egg and not moving with respiration. Tender on pressure, apparently adherent to posterior abdominal wall. Has lost weight.

Operation December 28th. Few filmy adhesions about stomach. Nothing except "in second portion of deodenum," where posterior wall contained a firm indurated mass size of English walnut. Short loop posterior gastroenterostomy. Immediate relief of symptoms. Discharged January 21, 1906.

This patient died on December 12th, 1908, of "Consumption," according to the records of the town of Bridgewater.

Case 29.—Mr. D. C. Age 45. Laborer. March 15th, 1905. M. G. H. Records. Vol. 504, p. 53.

For last ten years has had trouble with his stomach. Attacks occur very far apart; at other times coming on frequently. Pain comes on at first gradually, increasing in intensity, and is located for the most part in the lower abdomen. Pain usually comes on several hours after the ingestion of food and lasts for hours rather than days, and is worse at night. Most severe attack two and a half months ago, and has been wretched since with pain and vomiting.

Operation March 17th, 1905. Mass found in duodenum. On the stomach wall there was a scar, as if from an old ulcer. Sixteen inch loop anterior gastroenterostomy. Replied by letter one year later. Good result.

On June 7th, 1909, his wife reports that he is working every day and feels as well as ever.

Case 30.—Mr. E. C. C. Age 57. Collector for instalment house. May 1st, 1905. M. G. H. Records. East Medical. Vol. 623, p. 110. East Surgical. Vol. 508, p. 163.

Always well until five years ago, when he began to complain of weakness, dull ache in epigastrium "occurring every thirty minutes, and lasting about ten minutes." After four or five weeks the cramps passed off. Three weeks ago the third attack began. Cramps apt to come on at night without regard to eating or defecating. When the pain is intense may vomit two or three times watery or greenish material, which relieves the symptoms. Bowels regular except in these attacks, when he has small movements; no odor or blood. An indefinite mass was felt in the left side of abdomen. The diagnosis was thought to be malignant disease of the intestines. The stools were examined and blood found, marked peristalsis could be seen through the abdominal wall. The pain was somewhat relieved by enemata.

On May 13th, 1905, at three in the morning, he had sudden abdominal pain. His temperature was normal, and was relieved by hot water bag. On May 16th he was operated on, and a hard nodular mass felt in the head of the pancreas which was suspected to be cancer. Adhesions in the neighborhood. "Mass is size of hen's egg, hard and nodular, and occupying whole head of pancreas." He failed and died two weeks later.

Autopsy No. 1386.

ANATOMICAL DIAGNOSIS.

Chronic interstitial nephritis.
Chronic pericarditis.
Arteriosclerosis of the coronary arteries.
Chronic myocarditis.
Arteriosclerosis of the aorta and its great branches.
Slight fibrous endocarditis of the mitral and aortic valves.
Slight hypertrophy and dilatation of the heart.
Ulcers of the duodenum. Diverticulum of duodenum.
Chronic peritonitis. Chronic perisplenitis.
Acute general peritonitis.
Erysipelas of the face.
Operation wounds.
Questionable obsolete tuberculosis of the pleuræ of the apices.
Streptococcus septicæmia.

The stomach shows considerable dilation, but on section its mucosa is not remarkable.

Section of the duodenum discloses two well marked ovoid losses of its substance situated immediately beneath the pyloric

ridge and nearly extending around the circumference of the intestine. One of them measures 3.5 cm. by 1.5 cm. and the other 3 cm. by 1 cm. They have smooth rounded overhanging edges and smooth bases and extend to the muscular coat. A large vessel extends just beneath the base of one of the ulcers, and at one point in the base there is a minute, apparently open vessel. Cross sections of the ulcer, however, show minute thrombus-like plugs in them. Between the head of the pancreas and the wall of the duodenum there is a slight amount of fibrous-like tissue. In the median line of the duodenum about 3 cm. below the duodenal papilla there is a small pocket-like diverticulum given off about 2.5 cm. in length and 2 cm. in circumference, which extends backward and slightly upward in the direction of the head of the pancreas. The pouch ends blindly and its mucosa is directly continuous with the duodenum. The mucosa of the intestine elsewhere is not remarkable.

Case 31.—Mr. J. A. Age 32. Motorman. June 19th, 1905. M. G. H. Records. South Surgical. Vol. 114, p. 207. West Medical. Vol. 627, p. 48. South Surgical. Vol. 114, p. 257.

Twelve years ago dysentery with bloody stools. Last two years troubled with indigestion, feeling of weight in stomach after eating. Occasional vomiting. Never blood. Never had jaundice. Twenty-four hours ago discomfort in stomach which soon became severe, but went to work as usual. Pain persisted and he vomited once or twice. Slept fairly well in spite of pain. At the time of his entrance at the hospital the abdomen was full and tympanic, liver dullness was present and slightly enlarged downward. There was slight rigidity, especially to right and high up. Temperature 101.2, pulse 88, whites 21000. He was sent to the Ward. During the evening he had pain in the left shoulder blade, which could not be accounted for.

On June 21st he was seen by the medical consultant, who was unable to make a diagnosis. On June 25th the stools looked like old blood, and the guaiac test was positive. Patient was transferred to the Medical side, with a question of diagnosis. He was perfectly comfortable until about 10 o'clock in the evening, when he vomited about fourteen ounces containing clots and dark red blood. Felt weak and anxious. Temperature dropped and pulse went up. He was again transferred to the Surgical Service. Bloody movements continued.

On June 29th he was operated on, and adhesions and a small abscess found in the neighborhood of the first part of the duodenum, and evidence of an ulcer in the wall of the latter. This had apparently closed with fibrin, and no gas was escaping. The abscess was drained and a posterior gastroenterostomy done. On July 21st he was discharged well. Had had no vomiting or bloody stools since the second day after operation.

Case 32.—Mr. E. A. H. Age 25. Farmer. January 25th. 1906. M. G. H. Records. West Medical. Vol. 638, p. 12. Vol. 670, p. 145. West Surgical. Vol. 565, p. 9.

"For the past 15 years has had pain in region of right costal border, which he thought was cramps in the stomach. The pain has never been constant, the attacks lasting from three to five days, then gradually subsiding, leaving him much used up. For the past three years pain has been sharply localized in this region, so that it could be covered with one finger. Attacks have been more frequent the past year (1 week to 1 month, especially if he did heavy work or ate hearty food). Before one year ago average number of attacks was two per year. Pain is not constant during the attacks, but comes in spasms and is only relieved by taking 'pain killer' and hot water bag, leaning over back of a chair or by pressure over the part. During two attacks vomited a greenish material. The last attack the pain radiated to the back—never to the right shoulder. Three years ago, after an attack, noticed a bunch on one side (he does not remember which side), which was tender and gradually disappeared. The attacks of severe pain last from fifteen to twenty minutes. The duration of the whole being about two days. 'Yellow' three years ago, and thinks he has been so since. The worst attacks are accompanied by chills and later feels feverish. Last attack was last week, and was slightly yellow then. Tired after the attacks. Has had to give up work during the attacks and for the past year has done light choring, as milking and caring for the herd. Vomited during the attack last week, following medicine taken to relieve pain, etc." "Sleeps well, except if he eats solid food, when he has pain in the stomach. No pain in the chest. No cough. Walking on hard pavements or hard floor causes pain in the region above mentioned, especially during the attacks. Shortness of breath. No palpitation. Appetite always good between attacks. No nausea or vomiting. Bowels constipated." "Loss of strength during the attacks; in between them he feels as strong as ever." Heavy lifting or work that requires stooping over following a hearty meal tends to bring on an attack in two or three hours. (The question of 'hunger-pain' does not appear to have been asked.) Examination of abdomen normal."

He was discharged on January 29th, and told to come in during an attack.

May 27th, 1907, a year later, he appears again with perforation. "Since leaving the hospital, January 29th, 1906, has had more or less pain nearly all the time. Brought on by heavy work or eating heavy food; localized in right upper quadrant under costal margin. Worst attack ten months ago—lasted four hours. In bed a week at that time. For six weeks this spring has had steady pain—often severe enough to keep him awake at night. Has not been jaundiced for four years, but urine always high colored.

After an attack almost black. No change in color of stools. In three months has lost thirty pounds and much strength. Examination of abdomen normal except for tenderness on deep palpation over gall-bladder region.

Operation May 29th, 1907. Numerous light adhesions about gall-bladder which was such thickened and adherent to the duodenum. This adhesion was freed and disclosed a perforation of the duodenum to which the fundus of the gall-bladder had adhered, sealing it. Perforation closed with Paganstecher. Posterior gastroenterostomy. Cholecystotomy. Streptocoocus infection, and died on June 4th.

Autopsy No. 1941.

ANATOMICAL DIAGNOSIS.

Operation wounds. (Gastroenterostomy. Suture of the wall of the duodenum. Cholecystotomy.)
Ulcer duodenum.
Peritonitis.
Sero-fibrinous pleuritis (double).
Sero-fibrinous pericarditis.
Streptococcus infection.

The serosa of the intestines shows much injection in places and here and there is coated with fine grayish fibrinous-like material. An anastomosis is established by the posterior route between the very first portion of the jejunum and the stomach. The anastomotic joint is intact and fluid material passes freely from the stomach into the small intestine. The stomach, on section, other than described is not remarkable.

On cutting through the anterior wall of the duodenum in the region of the sutures mentioned there is disclosed on the free margin of the wall laterally and to the right a large portion of a loss of substance extending well into the submucosa. This portion measured 3 cm. in length and about 7 mm. in width. Its margins are bevelled and the base gray white and fairly smooth. The intestines, on section, below the point of attachment, are not remarkable.

Case 33.—Mr. T. C. Age 53. Stonecutter. January 29th, 1906. M. G. H. Records. West Medical. Vol. 638, p. 18.

Had been treated in the Out-Patient Department of M. G. H. since September 14th, 1903, at which time he had suffered from "stomach trouble" for six years. Diagnosis was made of dyspepsia and myocarditis. There is a long history in the Out-Patient Department Records during 1903, 1904 and 1905. The examination with test meals, etc., were constantly negative. During this time he also had symptoms of bad heart with dyspnœa, etc. The record alternates between stomach complaints and heart symptoms. The patient was evidently in very poor general condition.

On January 29th, 1906, he entered the hospital with symptoms of severe loss of compensation and also abdominal distress. On the 30th, while in the hospital, he woke at two in the morning with severe abdominal pain. Not relieved by morphine. Seen the next day by the surgical consultants, who thought his condition too poor to stand operation.

Autopsy February 1st, 1906. No. 1586.

ANATOMICAL DIAGNOSIS.

Ulcers of the duodenum with perforation of one of them.
General fibrino-purulent peritonitis.
Arteriosclerosis.
Insufficiency of the aortic, mitral and tricuspid valves.
Hypertrophy and dilatation of the heart.
Chronic passive congestion.
Anasarca.
Arteriosclerotic degeneration of the kidneys.
Obsolete tuberculosis of the lungs and bronchial lymph modes.

The duodenum, on section, presents in the mucosa of the anterior wall laterally and to the right a small loss of its substance. This loss measures 1 cm. in diameter and presents slightly elevated rounded margins which are bevelled down to the margins of the small opening previously mentioned as present in the wall of the duodenum in this situation. The base of the ulcer near the margin of the opening is grayish yellow in color and rather necrotic-looking. The mucosa at a point directly across the folds of the duodenum, about 3 cm. from the ulcer mentioned and in the posterior wall on the left, shows another small rather shallow loss of substance roughly triangular in shape. It measures about 4 mm. in greatest dimension. The ulcers are situated about 1 cm. below the pylorus. The small intestine is considerably distended, and contains a large amount of foul fluid material. On section the mucosa presents no lesions.

Case 34. Mr. H. D. Age 59. Salesman. March 23d, 1906. M. G. H. Records. South Surgical. Vol. 127, p. 173.

Never sick before. Never jaundiced. Three weeks ago began to feel that food distressed him, and had "empty" feeling. Appetite poor. Never noticed blood in stools. Three hours ago sudden abdominal pain and vomiting. There was blood in vomitus.

At operation a perforation supposed to be in the stomach was found and closed. A posterior gastroenterostomy was also done. The patient died on the 25th with acetone symptoms and glycosuria.

Autopsy No. 1643.

ANATOMICAL DIAGNOSIS.

Ulcer of the duodenum. (Sutured perforation.)
Operation wounds. (Gastroenterostomy.)
Peritonitis.
Glycosuria.
Chronic interstitial pancreatitis.

Stomach.—On section the mucosa of the stomach presents no lesions, except the wound of operation. The mucosa of the duodenum at a point very close to the pyloric ridge, and situated antero-laterally to the right, shows a small loss of its substance, measuring at least 8 mm. in diameter. The margins of this ulcer are rounded and smooth. The base is slightly irregular, and in its central portion slightly reddish and ragged. This part of the base is situated immediately beneath the sutures previously mentioned as being present in the wall of the duodenum at this point.

The intestines, on section, present no lesions other than a few very slight shallow losses of substance in the mucosa of the rectum, evidently stercoraceous ulcers.

Case 35.—Mr. B. O'C. Age 45. Longshoreman. M. G. H. Records. Vol. 652, p. 65. Vol. 134, p. 97. August 30th, 1906.

A case brought in moribund, and not operated on.

Autopsy No. 1774.

ANATOMICAL DIAGNOSIS.

Perforated ulcer of the duodenum.
General peritonitis.

In the posterior wall of the duodenum, 1 cm. below the pylorus, there is a punched out loss of substance in the wall rather circular in outline and 1 cm in diameter. This loss extends completely through the wall, and through it the contents of the stomach and duodenum pass into the peritoneal cavity. A short distance from the periphery of the ulcer on the peritoneal side there is a margin of fibrinous exudative material, but immediately about the ulcer there is none. On the mucosa side, the margins of the ulcer are rounded and there is only at one place, and this very slight if any, bevelling of the margins. The intestine, on section, elsewhere is not remarkable.

Case 36.—Mr. J. J. B. Age 28. Salesman. November 26th, 1906. M. G. H. Records. Vol. 547, p. 157.

History obtained May 13th, 1909.

Always used to have pain about navel when a boy (used to call it belly-button ache), often higher than navel. He began work at 16 in a carpet store, and has worked at it ever since ; now travelling salesman. Habits like most young men. Has taken more or less of liquor at times, cocktails, etc. When about 20 used to

have hunger-pain a great deal. There was tenderness at time of pain and also bloating. No vomiting. Had been well for several years until Nov. 22d, except that four weeks before he had had a mild attack like the one for which he was operated on. Hospital records states that there was also a mild attack nine weeks before. At the time of his hunger-pain never tried soda, but food often relieved him, but not always.

Nov. 29th, 1906, he entered the hospital with acute perforation. A median incision from the umbilicus down to the pubes was made and the abdomen thoroughly explored and the appendix found relatively normal. As the trouble evidently started in the region of the duodenum, another incision was made along the edge of the ribs; perforation found in the "second part of the duodenum" closed with fibrin. The lower incision was closed up with a small drain. Drainage was also made from the upper incision which was partly closed by suture. The perforation was not infolded.

After operation he went to the country to rest and was relatively well for ten weeks. In November he returned to work, and since that time has had severe epigastric pain occasionally, particularly several hours after meals and at night. At the time of the pain there is tenderness of the epigastrium and on one occasion he vomited after taking salt and water for the purpose. Had noticed no blood in his stools at any time. His pain has been severe enough to greatly interfere with his work, and he desires an operation if it can be expected to cure him. He was referred again to the hospital for study. Under rest and careful dieting the symptoms quieted down. The guaiac test of the stools was negative, and he was discharged with advice to rest, diet and return if the symptoms persisted.

Case 37.—Mr. C. S. H. Age 36. Lawyer. May 25th, 1907. M. G. H. Records. Vol. 563, p. 297.

"Two years ago seized with attack of acute pain in region of gall-bladder, with vomiting and no jaundice. This pain with remissions and exacerbations went on for nearly a year. He was then free of it until last December when he had another attack, lasting several weeks. For past two weeks has been having frequent attacks of severe pain in the right hypochondrium, with some vomiting. Yesterday had an attack which was much worse than any he had had before. Pain has continued. Patient required large doses of morphine to keep him quiet; vomited yesterday. Bowels constipated. No urinary symptoms. No jaundice. T. 100.4. P. 108. Abdomen tender and spasmodic, especially in right hypochondrium."

Operation.—Cloudy peritoneal fluid and fibrin. Gall-bladder normal, except for adhesions. "Small perforation, apparently in duodenum close to ampulla of Vater." Region of perforation

apparently well walled off by adhesions from abdominal cavity. Wicked.

(In all probability this localization of the perforation was inaccurate.)

Case 38.—Mr. J. C. Age 43. Shipping clerk. June 19th, 1907. M. G. H. Records. East Section. Vol. 580, p. 25.

"For past year has had grumbling pain in appendix region, associated with constipation; gives no history of gastric ulcer or indigestion."

Seven years ago he had a similar sudden abdominal pain. At the time of entrance his symptoms were typical of acute peritonitis from perforation of the duodenum. An incision was made over the appendix first, which was found slightly enlarged but evidently not the cause of the trouble. The incision was enlarged upwards and perforation found in the anterior wall of the duodenum. It was successfully sutured and the patient made a good convalescence.

On July 22d, 1908, the patient reported by letter that he was perfectly well, except for a slight indigestion which was easily relieved by eating. On August 18th, 1908, he reported that the indigestion had disappeared. On March 21st, 1909, he says that he has been perfectly well since, and has no trouble of any kind, although his occupation calls for considerable physical strength.

Case 39.—A baby, S. C. Age 3 months. October 8th, 1907. M. G. H. Records. Vol. 680, p. 185.

This child had not done well after the sixth week. Had been fed on condensed milk, and died with continual vomiting and blood in stools toward the end.

Autopsy No. 2024.

ANATOMICAL DIAGNOSIS.

Ulcers of the duodenum, with hemorrhage into the intestine.
Bronchopneumonia.
Fatty metamorphosis of the liver.
Ulcer of the cornea. (R)
Anæmia.

On section the duodenum beginning at a point just below the pylorus and in the posterior wall shows an irregularly shaped loss of substance. The ulcer measures 1½ cm. in length by 6 mm. in greatest width. The margins are somewhat irregular and the base shows a small adhering, reddish, somewhat granular mass of fibrin and blood clot like material. The ulcer extends into the submucosa. Immediately below this ulcer there is another very minute one, similar in character to the other.

The first portion of the small intestine contains much blood clot like material, and the lower part of the small intestine and the

large intestine contains a moderate amount of semi fluid chocolate colored material. The intestine otherwise is not remarkable.

Case 40.—Mr. J. D. Age 40. Rubber worker. Oct. 27th, 1907. M. G. H. Records. Vol. 575, p. 277.

Has never had a previous similar attack before. Has had a cough six months. Three days ago while at work had a sudden abdominal pain and vomited. On examination at the hospital there was felt by rectum "a very definite mass high up."

Operation.—Five inch median incision. Mass in pelvis was an abscess containing foul thick pus, while fluid in rest of abdomen was turbid, but not especially foul. No cause was found for the peritonitis. A perforation of the duodenum was evidently not suspected.

Autopsy No. 2038.

ANATOMICAL DIAGNOSIS.

Ulcers of the duodenum, with perforation of one of them.
Sub-diaphragmatic abscess.
General peritonitis.
Sero-fibrinous pleuritis. (R)
Hemorrhagic œdema of the lungs.
Operation wound. (Appendectomy)
Chronic pleuritis. (R)

The duodenum on section shows in its anterior wall, just below the pyloric ring and a little to the right of the median line, a circular loss of substance extending completely through the wall, and measuring 1 cm. in diameter. The inner aspect of the ulcer shows rounded, slightly bevelled margins, and the wall of the duodenum about the margins of the ulcer shows but little, if any, thickening.

The peritoneal surface of the wall of the duodenum in the region of the ulcer shows a few rather slight, foul, shaggy adhesions. The mucosa of the posterior wall of the duodenum just below the pyloric ring shows two very shallow losses of substance with slightly irregular margins and bases. The larger one of these ulcers measures 3 mm. in greatest dimension. Near these ulcers there is a minute, indefinite shallow area of depression.

The small intestine elsewhere is not remarkable.

Case 41.—Mr. C. W. Age 30. Feb. 20, 1908. M. G. H. Records. Vol. 602, p. 65.

Health always good. Says several years ago his friends noticed that he was jaundiced for about two or three days. Never before or since. Has had a few slight digestive disturbances at times. No previous similar attacks. About two weeks ago suddenly seized in early morning with sharp abdominal pain shooting across lower portion of abdomen. Also had pain in right hypochondrium.

Patient has been unable to work since, and has complained of pain and tenderness in right upper abdomen, and to less degree about appendix region. Has vomited eight to ten times since onset. Has noticed nothing in color of stools or urine. Has felt languid and unable to eat any but the lightest food. Pain in hypochondrium has been more or less constant, relieved for a short time by certain positions. To-day, says that pain is in region of right costal margin, and would feel fairly well if it were not for considerable tenderness there. Signs of localized peritonitis below right costal border. Came in in wheel chair. T. 100. P. 80.

Operation February 22d.—Adhesions. Pyloric end of stomach somewhat œdematous, and adhesions separated carefully from under edge of liver. Abscess containing about half an ounce of pus was found. Further dissection revealed thickened gall-bladder with no stones. No stones felt.

Considered perforated ulcer, but not definitely proved. Drainage. Convalescence uneventful.

Case 42.—Mr. W. F. H. Age 39. Irish teamster. February 27th, 1908. M. G. H. Records. East Surgical. Vol. 602, p. 177.

Patient was brought in moribund, and no history could be obtained, except that he had complained yesterday of sudden abdominal pain in the hypochrondrium. He died without operation.

Autopsy No. 2092.

ANATOMICAL DIAGNOSIS.

Hypertrophy and dilatation of the heart. (Physiological.)

Œdema and hypostatic congestion of the lungs.

Peptic ulcer of the duodenum with perforation, with escape of stomach contents into the cavity of the peritoneum.

Acute general peritonitis.

Upon section subcutaneous fat 1 cm. in thickness; section of the peritoneum is followed by the escape of gas with fecal odor; muscles red and firm; the parietal peritoneum mottled with bright red lines and points; slightly opaque; the cavity of the peritoneum contains rather abundant thin, slightly opaque, pale brownish fluid having an odor of stomach contents; the coils of the small intestine lightly inter-adherent by shreds of fibrin; the vascular peritoneum in places injected, smooth and of slightly diminished lustre; the front of the great omentum shows numerous areas of ecchymosis; the anterior surface of the duodenum at a point immediately below the pylorus, shows an oval opening .2 by .3 cm. through, which may be readily expressed fluid similar to that contained in the peritoneal cavity; anterior border of liver 8 cm. below the tip of the ensiform cartilage; vermiform appendix and mesenteric lymph nodes natural.

Gastro-intestinal Tract: Stomach upon section contains a little pale brown fluid material; the mucous membranes negative.

Intestines: small intestine; the front wall of the duodenum at the point above noted, presents the conditions already described; the surrounding peritoneum fairly smooth; on section, this opening corresponds with a pocket irregularly oval, the edge of which is 1 cm. below the inner margin of the pylorus; the edges fairly regular, the sides funnel-shaped; the opening in the mucous membrane is about 1 x .6 cm., the surrounding border is negative; the upper part of the small intestine is somewhat relaxed, partly filled with fluid material; elsewhere practically empty; the peritoneum in places slightly injected, throughout a little cloudy, and here and there overlaid with lightly adherent fibrin; the large intestine partly filled with scybala; the mucous membrane natural.

Case 43.—Mrs. M. B. Age 57. May 5th, 1908. M. G. H. Records. South Section. Vol. 160, p. 315.

Was brought to the Accident Room on May 5th, 1908. No previous similar attack. No history of gastric trouble. Five days ago acute pain and vomiting. Went to Emergency Hospital, where she has been since. Has been in constant pain, vomiting continually, and has had no movement for six days. Abdomen distended, and mass in epigastric region.

Operation.—Five inch incision in right rectus; two very black and shiny coils of small intestine pulled out with difficulty. Constriction found at both ends of black bowel at about middle of small intestine. Forty-two inches of black gut removed. On May 9th, four days later, an attempt was made to do an end anastomosis, which resulted in a fæcal fistula. The patient lost strength, and died on May 20th.

Autopsy No. 2152.

ANATOMICAL DIAGNOSIS.

Fibrino-purulent peritonitis.
Operation wound. (Excision of a portion of intestine.)
Chronic interstitial nephritis.
Ulcers of the duodenum.
Chronic pleuritis.
Streptococcus septicæmia.

On the anterior wall of the duodenum, about 3 cm. from the pylorus, there is an irregularly shaped loss of substance in the mucosa, 2 cm. in greatest dimension. This loss of substance extends down to the muscular coat. The base is smooth with some finely shaggy, yellowish material. The edges are ragged, rounded over, but show no induration. On the peritoneal surface, opposite this ulcer, there is slight puckering with some omental fat adherent. About 3.5 cm. from the pylorus, on the posterior wall, there

is a similar loss of substance in the intestine, 9 mm. in greatest dimension. A third similar loss of substance is found measuring 3 mm. in greatest dimension, and situated about 3 cm. from the pylorus on the anterior surface. The intestines otherwise are not remarkable.

Case 44.—Rev. Mr. A. P. Age 65. Clergyman. June 12th, 1908. M. G. H. Records. West Section. Vol. 597, p. 293.

This patient had been in the hospital a year previously, and had had a prostatectomy done. He had a hernia, and had worn a truss for five years. He was operated on under the diagnosis of malignant stricture of the sigmoid. He stated that ten days before entrance he was exposed to rain, and got wet. Next morning began to have pain across his lower abdomen, especially to the right side. Pain was very severe, but was not accompanied by vomiting, and was spasmodic in character. While in the hospital he passed some clotted blood by rectum.

At operation on June 12th thin, cloudy, straw-colored fluid was found in the abdomen. There was pus in the right iliac fossa, and the appendix was normal. In the pelvis beyond the bladder was a large mass of matted intestines and more pus. This surrounded a small hard mass probably in the sigmoid. This was supposed to be a malignant stricture of the sigmoid which had perforated. An enterostomy was done in the sigmoid above the lesion. The patient died on the nineteenth day.

Autopsy No. 2171.

ANATOMICAL DIAGNOSIS.

Operation wounds. Colostomy.
General fibrino-purulent peritonitis.
Purulent bronchitis. Peritoneal lipomatosis.
Stenosis of the signoid. Duodenal ulcer.
Arteriosclerosis.
Fibro-calcareous endocarditis of the aortic valve.
Fibrous endocarditis of the mitral valve (slight).
Hypertrophy and dilatation of the heart.
Obsolete tuberculosis of the lungs and a mesenteric lymphatic gland. Small enterocystoma.
Double inguinal hernia. Hydrocele.
Cholelithiasis.
Arteriosclerotic degeneration of kidneys.
Slight fatty metamorphosis of the liver.
Central degeneration of lobules of liver.

About 2 cm. beyond the pylorus, on the posterior wall of the duodenum, is an oval loss of substance about 2 by 1 cm., and which is about 3 mm. in depth. The edges are smooth, rounded, overhanging, but not indurated. The base is shaggy, and contains

a few shreds of black material. There is no evidence of leakage through this ulcer in the adjacent tissues. The mucosa of the intestines otherwise is not remarkable. There is generally a great abundance of fatty tissue in the retroperitoneal tissue, in the omentum, and in the mesentery. The appendices epiploicæ are very large. In the region of the sigmoid, beginning just above the brim of the pelvis and extending down behind the bladder, there is an irregular lobulated series of masses which are connected with the mesentery. These masses are not adherent to the wall of the pelvis or to other structures. On section, some of these masses seem to be enlarged appendices epiploicæ, while others are fatty masses with strands of fibrous tissue running into them. These masses are contiguous with the external coat of the intestines, and they have no apparent connection with the mucosa. In the situation of these masses the lumen of the large intestine seems to be distinctly smaller, but there is no occlusion. In situ there is no kink or twist of the intestines. The whole large colon is rather small. The small intestine is of normal size. The stomach is distinctly distended. There is one fibrocalcareous lymphatic gland in the mesentery, and here and there in the mesentery there are smaller and larger masses which on seetion are made up of fatty tissue.

Case 45.—Mr. F. J. McH. Age 24. Oct. 7th, 1908. M. G. H. Records. West Section. Vol. 611, p. 183.

Always well; no previous attack. A few weeks ago patient was seized with attack of epigastric pain while at work; this was followed by a hollow feeling in his stomach having no relation to his food. This feeling has continued with occasional periods of relief.

The evening of the day before entrance he had eaten a hearty supper, smoked a cigarette, and fell asleep in his chair. He was wakened from his nap with a violent cramplike pain, etc.; was brought to the hospital with signs of a general peritonitis. At operation perforation was found in the first portion of the duodenum, and closed. He made a good recovery, and was discharged on the eighteenth day.

Case 46.—Mr. M. C. Age 60. Nov. 2d, 1908. M. G. H. Records. East Surgical. Vol. 626, p. 149.

For the past few years he has had numerous attacks of what he considered indigestion. These attacks consisted of pain, usually in the epigastrium. He had had nausea and sometimes vomiting, but the pain has never been severe enough to prevent him from doing his work. The attacks have come at intervals of three or four months for the past few years. With these exceptions the patient has always enjoyed unusually good health. Has been a hard drinker. Has never been jaundiced.

Two days ago, when returning from work, had a sudden sharp pain in the epigastrium, so severe that he dropped in his tracks and had to be helped home by bystanders. When brought to the hospital he presented signs of general peritonitis from a high appendix or perforation of an ulcer. The surgeon who saw him thought at the operation that duodenal ulcer was the most probable diagnosis. During the operation the foul smelling abscess and the location to the outer side of the colon, made him favor appendicitis. A portion of the appendix was dug out and removed. Several days afterwards the discharge from the wound rendered duodenal ulcer again the most probable diagnosis.

The patient lived for some weeks, and died on December 2d.

Autopsy No. 2229.

ANATOMICAL DIAGNOSIS.

Ulcer of the duodenum, with perforation.

Subdiaphragmatic abscess, with extension into the lower lobe of the right lung.

Abscess of lower lobe of right lung.

Empyema, right.

Obsolete tuberculosis of apex of right lung and of a mesenteric lymphatic gland.

Chronic pleuritis.

Arteriosclerosis.

Chronic perisplenitis.

Chronic appendicitis.

Laparotomy wound.

The operation wound in the anterior abdominal wall leads down into the region of the gall bladder and into a mass of adhesions which bind the upper end of the duodenum and the stomach in the region of the pylorus and the omentum and transverse colon to the under surface of the right lobe of the liver anteriorly and to the round ligament of the liver, and in close relation to the parts mentioned the anterior surface and a portion of the upper surface of the right lobe of the liver are bound to the diaphragm by rather firm adhesions at the margins of a roughly circular area about 15 cm. in diameter. Separation of these adhesions permits the escape of a considerable amount of semi fluid purulent material from between the liver and the diaphragm, and the surface of the liver within the area mentioned is coated with soft, yellowish, fibrino-purulent material. The diaphragm over that portion of the area on the superior surface of the right lobe shows a complete interruption in its continuity with ragged, irregular necrotic margins. The diaphragmatic surface of the lower lobe of the right lung is adherent to the diaphragm about the margins of the ragged opening just described, and through this opening the fingers pass directly into purulent, infiltrated, necrotic disintegrated lung

tissue. The opening in the diaphragm measures about 4 cm. in greatest dimension. The under surface of the left lobe of the liver is weakly adherent to the anterior surface of the stomach. The stomach is contracted down and tubular in shape. On section the stomach presents no lesions.

The walls of the first portion of the duodenum are slightly thickened, and the anterior wall presents adhesions which are continuous with the adhesions previously mentioned, and at a point in the anterior wall just below the pylorus, and laterally to the right, there is a complete interruption in the continuity of the wall of the duodenum through which opening the lumen of the duodenum communicates with the space enclosed by the adhesions previously described as present in this region. On section the pylorus is contracted, and the upper portion of the duodenum is also contracted down. The remaining portions of the duodenum are not remarkable. The pylorus and the upper portion of the duodenum do not admit the passage of the little finger, but do admit the passage of the large probe. The mucosa of the duodenum, immediately below the pylorus and laterally to the right and extending on to the anterior wall, shows a roughly oval shaped loss of substance with fairly smooth, rounded margins, which over one half of the ulcer extend down to a fairly smooth base, and which over the other half of the ulcer extend down to the margins of the opening previously described as present in the wall of this portion of the duodenum.

The ulcer measures about 2½ cm. in its long diameter, and the opening in the base, which is slightly irregular in shape, measures about 12 mm. in its greatest dimension. The intestines elsewhere on section are not remarkable.

Case 47.—Miss H. P. A. Age 50. Trained nurse. Jan. 8th, 1909. M. G. H. Records. West Surgical. Vol. 255, p. 22.

Was referred to the Massachusetts General Hospital from the House of the Good Samaritan for an acute attack of endocarditis.

Autopsy.—January 8th, 1909. Duodenal ulcer found.

Autopsy No. 2278.

ANATOMICAL DIAGNOSIS.

Acute meningitis. (Pneumococcus.)
Polypus endocarditis of the mitral valve.
Fibrous endocarditis of the mitral valve.
Hypertrophy and dilatation of the heart.
Slight arteriosclerosis.
Infarct of the kidney.
Soft spleen.
Ulcer of the duodenum.

The duodenum shows in its mucosa at a point a little below the pylorus a small elongated oval loss of substance about 1½ cm. in greatest diameter. The margins of the ulcer are rounded and descend abruptly to a smooth thin base, which consists practically of the slightly thickened peritoneal coat. The peritoneal side of the base of the ulcer is perfectly smooth and shining. The base of the ulcer breaks upon handling. The small vessels leading to the margins of the ulcer are apparently free. At one point in the margin of the ulcer is a minute, slightly softened dark reddish area.

The intestine elsewhere is not remarkable.

Case 48. — Mr. D. K. Age 45. Choreman. M. G. H. February 6th, 1909.

For six months to one year has had occasional epigastric distress. About Sept. 1st began to vomit almost every day. Sometimes after eating and sometimes on getting up in the morning. Distress generally began about noon and lasted until night. Slept fairly well. Difficult patient to obtain history from. No excess of alcohol. In the last year has lost thirty pounds, most of it lately. Has been under careful physician who has brought about considerable improvement by attention to diet, etc. Blood was found in vomitus.

A week ago woke up feeling well, but at about 8 o'clock in the morning, while shovelling snow, was taken with sudden epigastric pain. Vomited. Had had no breakfast. He stopped work at once and went to bed. Pain has continued, and has been mostly in region of gall-bladder. The pain is griping in character, and feels better when he sits up. There is no tenderness and soreness in region of gall-bladder. He was kept under observation in the Medical Ward for three days, and then transferred to the Surgical side. When operation was done an abscess in the region of the gall-bladder was found and evacuated. He was twice later operated on for sub-phrenic abscess.

His strength gradually failed, and he died on the 9th of April.

Autopsy No. 2348.

ANATOMICAL DIAGNOSIS.

Ulcer of the duodenum.
Chronic peritonitis.
Acute diffuse fibrino-purulent peritonitis.
Acute pleuritis, left.
Chronic pleuritis, right.
Abscess lower lobe of right lung.
Abscesses of the liver.
Slight hypertrophy and dilatation of the heart.
Scars of operation wounds.
Thrombus in inferior vena cava.
Pneumococcus septicæmia,

The transverse colon in the region of the hepatic flexure and the pyloric end of the stomach, the duodenum and the retroperitoneal tissues about the upper pole of the right kidney, and the right adrenal and the under surface of the liver, are bound together by dense firm gray white homogeneous inflammatory-like tissue. In places this inflammatory tissue is about 5 mm. in thickness. The anterior margin of the right lobe of the liver is bound to the parietal peritoneum by firm adhesions. In the region of the spleen and upper pole of the left kidney there are adhesions also. Breaking up these adhesions liberated in the region of the liver and spleen, large pockets of slimy pus. Between the anterior surface of the right lobe of the liver and the diaphragm there is a small space which shows only a small amount of this pus.

At a point on the posterior wall of the duodenum laterally and to the right, and about 2 cm. below the pylorus, the mucosa shows a roughly triangular-shaped loss of substance about 2 cm. in greatest dimension. The ulcer has smooth rounded margins which extend rather abruptly to a smooth fibrous looking base. At one point in the base of the ulcer situated at the extreme right there is a slight depression. The wall of the duodenum in this situation is buttressed by the adhesions and inflammatory tissue previously mentioned. The mucosa in the region of the right end of the ulcer is thrown into two or three small thickened fold-like masses, and there are one or two small grayish smooth streak-like areas extending off from the margin of the ulcer. From the left extremity of the ulcer a grayish, slightly depressed, narrow, streak-like area extends directly across and around the duodenum as far as the cut edge on the left side. In one or two places in the region of the left end of this streak-like area it broadens out slightly over a very short distance into small smooth somewhat fibrous-like areas. This streak-like area extends around parallel to the pylorus, and at about a distance of 1½ cm. from it. The triangular ulcer and the cicatricial-like streaks extending from it around the duodenum roughly form an annular, shallower and deeper area of cicatricial-like depression. Just below the pylorus the mucosa of the duodenum shows one or two small irregular areas of depression.

Sections from this case published in my previous paper show that the "streak-like area" was the scar of old ulceration.

Case 49.—Mr. D. F. McN. Age 23. Works in shoe shop. June 2d, 1909. M. G. H. Records. South Surgical. Vol. 164, p. 217.

Has always been well, except for slight indigestion for past four years and one attack of abdominal pain a year and a half ago, which lasted a week. Twenty-seven hours before entrance had a

severe attack of general abdominal pain, which became localized in the right lower quadrant. Abdomen slightly distended, tympanitic throughout, and considerable spasm, especially in right lower quadrant. Diagnosis was supposed to be appendicitis, and a right rectus incision was made. The appendix appeared normal, and further exploration showed that pus came from the region of the stomach. A median incision was then made above the umbilicus; "on the posterior surface of the upper second portion of duodenum was found a perforation." Perforation was not sutured, but drained through a stab wound in the side.

Convalescence was uneventful.

Case 50.—The following case is that of a personal friend who was operated on by another surgeon.

He is about 35 years old, and has been strong and well except for the stomach symptoms which follow.

Eight or nine years ago, when working very hard, he had pain and burning on an empty stomach; that is, two to four hours after eating. This was easily relieved by alkalies and taking food. Since that time he has had occasional similar attacks of distress with an empty stomach, and has considered them due to hyperacidity. He has always been subject to looseness of the bowels; that is, three or four loose movements daily without pain. He has always had a rather weak stomach.

Two years ago, after an unusual amount of hard work and worry, he began to have more trouble with his stomach, and lost considerable weight. The trouble consisted of epigastric pain and burning two hours or so after eating, and very often at night also. There was at the same time a looseness of the bowels, amounting to a diarrhœa, so that he became quite weak and was unable to do his ordinary work. Resting and milk diet brought about improvement, but on working again he found that he was subject to irregular attacks of trouble with his stomach which lasted for a few days to about a week. In the interval between the attacks he felt pretty well, but did not regain his weight. There was some vomiting during the attacks, nearly always at night. The vomitus consisted of food immediately eaten, or if the food had not been taken for one or two hours, of a thin, watery substance. Nausea was slight, and he was even able to eat during an attack. As a rule, food, especially milk, would relieve an attack temporarily. Bismuth and bicarbonate of soda sometimes would and sometimes would not relieve an attack. He felt best on a full mixed diet with food between meals. Sometimes apparently an attack would be aborted by checking the diarrhœa, which usually preceded an attack, and by securing a good night's sleep. The vomitus on several occasions showed large amounts of free hydrochloride acid, but never any blood. Frequent abdominal exami-

nations were made, but were always negative. There was at times some slight tenderness in the epigastrium, in the median line. He lost weight fairly steadily for about a year. The attacks grew worse in severity, and in May, 1908, he went abroad for a month, and had no attack while he was gone, although his bowels continued loose. On arriving home he had a very severe attack, and went on a vacation, and did not work in the summer. He had some indefinite epigastric disorder, but no regular attack. He did not regain his weight.

On returning to work attacks came on with rather more severity than before, the only difference being that there was no diarrhœa. At this time he was fairly careful of his diet, and was on a mixed diet, with fairly low proteids and milk between meals.

About April of this year he had a very severe attack of a similar type, and a point of slight tenderness was made out just to the right of the umbilicus and slightly above it. He has recently been operated on, and a duodenal ulcer found. Gastroenterostomy was done, and relief since the operation has been most satisfactory.

ARTICLE XXV.

THE LOCALIZATION OF PAIN, TENDERNESS, AND HYPERALGESIA IN THE DIAGNOSIS OF SOME COMMON ABDOMINAL DISEASES.

By G. deN. HOUGH, M.D.
OF NEW BEDFORD.

READ JUNE 15, 1909.

THE LOCALIZATION OF PAIN, TENDERNESS, AND HYPERALGESIA IN THE DIAGNOSIS OF SOME COMMON ABDOMINAL DISEASES.

While by no means wishing to disparage the value of Previous History or Constitutional Symptoms in the diagnosis of abdominal diseases, it is indubitably true that the local symptoms are of paramount importance in this connection, and it is to these alone that I wish to direct your attention.

To-day the great majority of practitioners recognize at once the typical cases of appendicitis, gall bladder inflammation and perforation of the stomach or duodenum, and they also recognize (which is equally if not more important for the welfare of the patient) that these are grave surgical emergencies. We must now advance a little farther in diagnostic skill and learn to recognize those less frequent, but by no means rare, cases in which the symptoms are atypical. I would by no means assert that this is always possible, but we can at least utilize all means at our command and fail, if fail we must, from no personal deficiency.

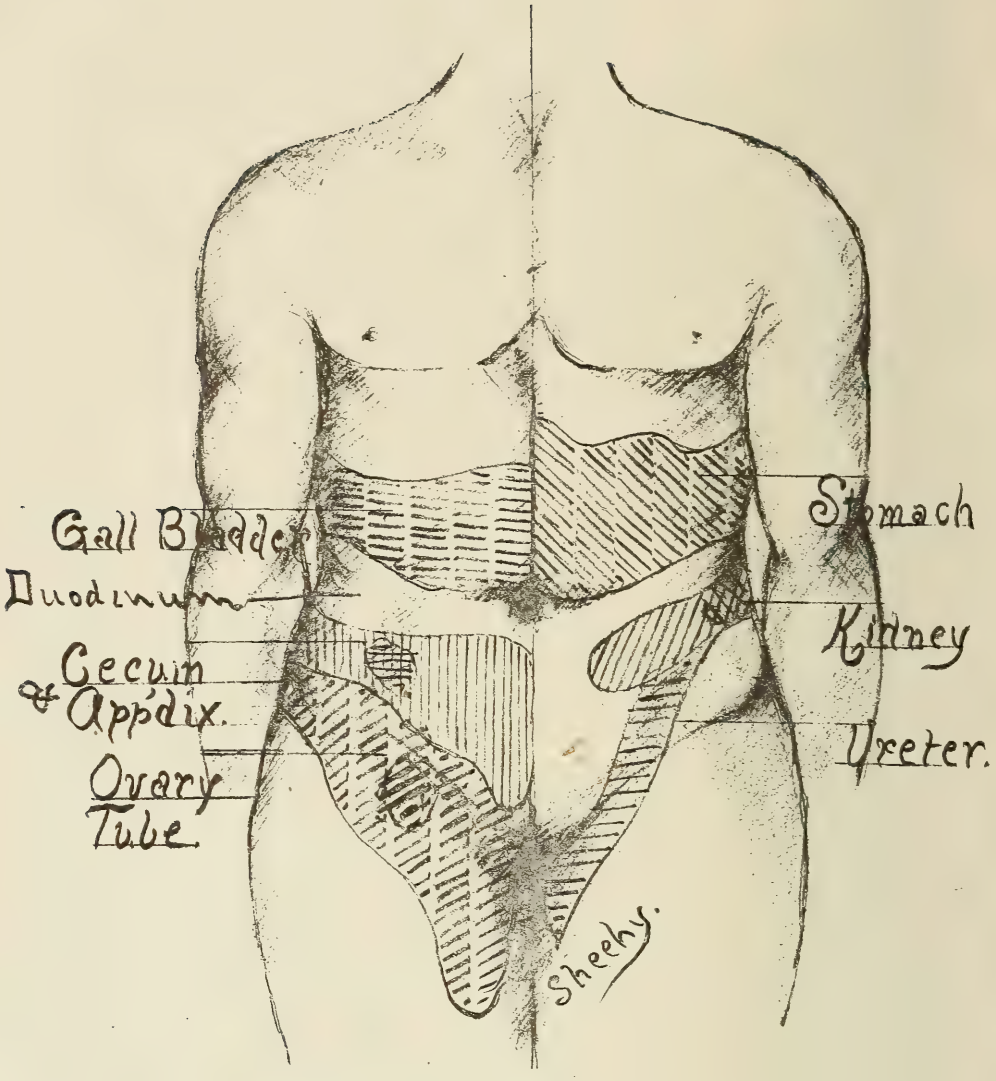
Let us take first that commonest of abdominal diseases, appendicitis. Pain, tenderness and rigidity in the right lower quadrant do not always mean appendicitis, and it is equally an error to assume that unless those signs are present in that quadrant appendicitis is absent.

I have myself seen an erroneous diagnosis of appendicitis made because pain, tenderness and more or less rigidity were present in the right lower quadrant in the following

conditions: inflammation of the right tube and ovary, right ureteral stone, acute cholecystitis, acute inflammation of a Meckel's diverticulum, acute localized inflammation of the cœcum, acute psoitis, perforation of the gall bladder and perforation of the duodenum.

On the other hand, the pain and tenderness are not always in the right lower quadrant. Especially during the first few hours of an attack the pain may be on the left side, sometimes above, at other times below the umbilicus, and shifting after a time to its normal site. Such shifting does not always occur. I have seen the pain remain on the left side throughout the whole course of the disease. Again the pain may be in the median line below the umbilicus, may be so high that one thinks at once of gall bladder disease, is sometimes in the region of the right kidney, and I have even observed it in the rectum, bladder or urethra.

The point or area of maximum tenderness is rarely as much displaced as the pain. Often the site of the pain is aberrant, while the localization of tenderness is normal, or nearly so. Still we may find the tenderness at, or a trifle to the left of, the median line, in the right upper quadrant, in the kidney region, or in the rectum or vagina. These unusual situations of pain and tenderness are most commonly due to an abnormal situation of the appendix; thus an undescended or partially descended cœcum will result in appendicular pain and tenderness being situated higher up than usual, even as high as the border of the ribs, and a long free appendix with undescended cœcum may if inflamed become adherent to the gall bladder or liver. Prolapse of the cœcum (which is not at all unusual) will carry the appendix into the pelvis, and then the pain and tenderness approach or even pass the median line; or, if the inflamed organ becomes adherent to the rectum or bladder, we may have the pain referred to one of these organs (or to the urethra) often with serious disturbance of their functions.


Gall Bladder
Duodenum
Cecum
& Appdix.
Ovary
Tube
Stomach
Kidney
Ureter.
Sheehy.

It is hardly necessary to say that in case of transposition of viscera the pain, etc., would naturally be in the left lower quadrant instead of in the right.

When the appendix is retroperitoneal it is liable to be quite long, to extend well up toward, or even to the kidney, and to give rise to pain in the right loin instead of in the iliac fossa. In such cases the tenderness may be anywhere from the kidney to its normal site.

Now in many, perhaps in most, cases of appendicitis there is an area of cutaneous hyperalgesia which, if recognizable, is of immense diagnostic importance, especially in the cases where the situation of the pain and tenderness is aberrant.

This matter of definite areas of cutaneous hyperalgesia associated with disease of particular organs will well repay close study. They were first described by an Englishman, Henry Head, about 1893, and there is a most excellent recent article on the subject in the November, 1908, number of the *American Journal of Medical Sciences*, by Elsberg and Neuhof. These zones are not present in all cases, and in any particular case may be present at one hour and not at another. The absence of a zone is therefore of no value as negative evidence, but its presence is a very certain indication that the corresponding organ is diseased. The extent of the zone varies in different cases, and for every zone there is probably a small area of maximum hyperalgesia, to which small area the whole zone may be reduced. The sketch well represents the zone for the appendix; the small, more darkly shaded area representing the maximum and sometimes the only area of hyperalgesia.

It is not unusual in females to meet with a case where one has great difficulty in deciding whether the right tube and ovary are inflamed, or the appendix, or both. In many of these cases a study of the hyperalgesic zones will settle the question.

Let me quote a case in point. M. H., single, age 20, was seen on Oct. 26th, 1908, on account of an acute cholecystitis for which I performed cholecystostomy the same day. In getting her history I found that she had been entirely well well up to August, 1907, when she was taken sick with what was considered acute appendicitis. She was sick in bed four weeks. No operation was performed. She did not recover her health, and four months later had a second acute attack precisely like the first. At this time the appendix was removed. She was in bed six weeks after the operation. She did not recover her health even then, but continued to have pain and tenderness, just as before the operation, in the right lower quadrant over an area nearly as large as the palm of my hand, which extended from the inguinal fold to a line a little above the scar of the appendectomy. The pain was increased by standing or walking, was worse at the menstrual periods, and she was quite unable to work. In this condition she had remained up to the time that I saw her. There was no suggestion in her history of any gall bladder trouble preceding this acute attack which had begun about forty-eight hours before I saw her. Was the trouble in her lower abdomen due to adhesion to tubal disease or to a neurosis? One hesitates in an unmarried girl to suggest a pelvic examination. I found by studying the zones of hyperalgesia that both the zone for the gall bladder and that for the right tube and ovary were well marked. Then I made a pelvic examination and found a retroflexed, adherent uterus, and a palpable mass in the right side of the pelvis, which was slightly tender. Three weeks after the cholecystostomy I operated for the pelvic disease; fifteen days later she left the hospital well, and remains so.

The case, which, more than any other that I have seen, shows of what great value the hyperalgesic zone may be in diagnosis, is as follows: A widow, aged 74, was seen at

8 P.M., Dec. 24th, 1908. She had been sick two weeks with pain in her right side and continuous nausea. For ten days nothing whatever had been retained by the stomach. Her pain was high in the right upper quadrant, in the anterior axillary line, close to the ribs, in character like the pains of labor; a pain occurring about every three minutes and lasting about one minute. Temp. 99°. Pulse 98, feeble. White count 6,000. Tenderness maximum at the point of pain, gradually diminishing towards the level of McBurney's line and toward the gall bladder, very well-marked also in the whole right kidney region. Very slight muscular rigidity of the abdomen, considerable of the loin muscles. Throughout her illness movements of the bowels had been obtained with much difficulty, and for three days she had had no movement and had passed no gas. Abdomen moderately distended. I found a small area of intense hyperalgesia at the usual maximum for the appendix. I must confess that I was surprised and felt some grave misgivings as to the correctness of the inference to be drawn. Nevertheless the sign had never been known to fail, so I told the family that the trouble was appendicitis with some obstruction of the bowel consequent upon that inflammation.

I found at the operation an undescended cœcum, embedded in a large inflammatory mass. At the bottom of this mass, in close contact with the kidney, I found the inflamed and perforated appendix with a small abscess around its tip. She has made an uninterrupted recovery.

In perforation of the gall-bladder or duodenum the septic or irritating fluid is apt to flow toward the right, along the shelf made by the transverse mesocolon, and then downward along the outer side of the ascending mesocolon to the vicinity of the appendix, where it sets up an irritation, and the symptoms presented may simulate appendicitis very closely. In these cases a study of the hyperalgesic zones may at once clear up the diagnosis.

Ureteral stone has been mistaken for an acute appendicitis by the very elect. The zone of hyperalgesia, if present, will prevent such an error.

Let us now pass to a consideration of cholecystitis. The situation of the pain is subject to a wide range of variation. At times it is in the right lower quadrant, at other times it is higher than normal in the seventh or sixth intercostal space, even under the sixth rib, in or a bit mesad from the anterior axillary line; again, we find it under the left costal arch instead of under the right, occasionally in the right, or even in the left, renal region, radiating downward and forward like the pain of a renal colic, but never to a point below the crest of the ilium. I have several times observed the pain limited to the right back, its point of maximum intensity at the point of Boas (the border of the right erector spinæ between the eleventh and twelfth ribs), which is liable to lead to a diagnosis of lumbago or pleurisy. It may be felt only in the upper part of the sacral region. In two of my cases the pain seemed to start in the right sacro iliac joint, radiating through the abdomen to a point a little below and to the right of the umbilicus. In one case the pain was felt only at a point to the left of and on the same level as the umbilicus.

With all this variation in the site of the pain the situation of the tenderness is much less variable. It is found almost always over the gall-bladder itself, being in the right lower quadrant rarely save when the gall-bladder is much enlarged or the liver is prolapsed so that the gall-bladder is itself in that quadrant. In addition to this tenderness we often find marked tenderness at the point of Boas, and once in a while the tenderness is at that point alone. This tenderness at Boas' point is very common in disease of the gall-bladder (whether with or without stones), and in cases of stone in the common duct, and is often supposed to occur only in those conditions. This is, however, by no means true. It

is frequently present in cases of ulcer of the duodenum, and I have observed it in a case of hydatid cyst of the liver and in a case of syphilitic liver with old, strong adhesions to the diaphragm.

[This syphilitic case is worth quoting. A woman, single, aged 26, had syphilis several years ago. Has been more or less jaundiced ever since she can remember. For the past twelve years, at least, has had typical symptoms of common duct stone: colics, ebb and flow jaundice, sharp attacks of chill, fever and sweating of a few hours' duration. There was marked tenderness in the gall-bladder region and at Boas' point. Liver and spleen moderately enlarged. Blood showed an anæmia consistent with syphilis and a rather slow coagulation time. After a couple of doses of fresh animal serum to prevent hemorrhage after the operation, I opened the abdomen and found the following remarkable state of affairs. There was no trace of a gall-bladder or cystic duct. At the usual site of the gall-bladder there was a peritoneal ligament or mesentery passing from the liver to the duodenum. The common duct did not pass through the pancreas, and could very easily be palpated from the liver to the duodenum. It was of normal size, and no stone could be felt in it. The liver was moderately enlarged, rough and irregular, and firmly adherent by very numerous and tough adhesions to the diaphragm. The spleen had a similar surface, and was similarly adherent to the anterior abdominal wall. As soon as possible treatment by intravenous injections of bichloride of mercury was begun, and all her symptoms, including the jaundice, rapidly improved.]

Wherever the pain and tenderness may be situated we are very likely to have, in cholecystitis, a characteristic zone of hyperalgesia. If present it is of very great diagnostic import.

Focal Suppurative Nephritis is a disease that has been recognized but recently. Many of the cases are difficult to diagnose. Typically the pain is renal, and there is tenderness in the costo-vertebral angle. But the pain may be localized in the region of the appendix or gall-bladder. In

some of these cases, perhaps in many, the zone of hyperalgesia corresponding to the kidney will be of great assistance in the diagnosis.

In duodenal or gastric perforation the diagnosis is often obscured by the pain and tenderness being in the left upper or lower or right lower quadrant. If the zone of hyperalgesia corresponding to one of these organs can be made out, and very often it can, the diagnosis is much facilitated.

The points that I wish to make in this paper are then two. First, in many of the commoner abdominal diseases atypical situations of pain and tenderness are not infrequent. Second, and consequently, always look for the zones of cutaneous hyperalgesia, which, as far as is now known, when present do not lead one astray.

ARTICLE XXVI.

POST-OPERATIVE ACUTE DILATATION OF THE STOMACH, AND ITS RELATION TO MESENTERIC ILEUS.

By HOMER B. SMITH, M.D.
OF BOSTON.

READ JUNE 15, 1909.

POST-OPERATIVE ACUTE DILATATION OF THE STOMACH, AND ITS RELATION TO MESENTERIC ILEUS.

THERE is a numerous class of cases of dilated stomach met with in every-day practice in which there is a known stenosis of the pylorus due to tumor, scar contraction, etc. These patients exhibit variable symptoms depending upon the nature of the obstruction, but mostly associated with the inability of the contents to pass the pylorus. When the stomach becomes distended it relieves itself by vomiting, and these patients may go on for months or years with proper medical or surgical care, and do not die as a result of over-distention of the stomach of itself.

Acute dilatation of the stomach is not a disease, but a complication, a condition coming on suddenly "out of a clear sky," in the course of almost any medical or surgical disease. It may not be associated with any previous stomach malady. Indeed, associated pyloric stenosis is rare, the obstructing factor as evidenced by clinical and post-mortem facts being usually in the duodenum. The course of the complication is rapid, with final circulatory and respiratory failure and death, due to the enormous dilatation itself.

The complication has occurred in the course of acute infectious diseases, in chronic wasting diseases, following injuries to the base of the skull, and injuries to the spine, in Pott's disease, in scoliosis, after excessive eating or drinking, following a paroxysm of laughter or fright, but according to Nicholl's analysis of the 217 reported cases,

it occurs more often after surgical operations under general anesthesia than from any other cause. Although more than two-thirds of these cases occur after laparotomy, and most often after operations on the biliary tract, the complication may occur after operations not connected or associated with the abdominal viscera, as after operations on the extremities.

The following case is a typical one: I was called in the evening to see a woman of thirty-one, who was said to be much distended, vomiting frequently, and with a rising pulse. Thirty-six hours before she had undergone a laparotomy for pelvic peritonitis in which both tubes were removed. She had recovered well from the operation and there had been no post-anesthetic vomiting. Twenty-four hours after operation her condition was satisfactory, although the abdomen presented slight general distention, for which an enema was ordered. Six hours later, when I saw her in the evening, she was pale, sweating, breathing rapidly, the pulse weak and irregular, ranging from 150 to 160. She was apparently in great distress, frequently regurgitating a small amount of greenish fluid and gas. There was marked general distention. The enema given in the afternoon had not brought away any appreciable amount of gas. Another enema given while I was there brought away considerable gas, but at the end of an hour she had not improved. She had continued vomiting small amounts. A third enema was productive of excellent results, and then the real diagnosis became apparent because it could be seen. A rounded tumor filled the epigastrium, extending down on the left to just below the umbilicus. The abdomen was flat below this. The tumor was smooth, tympanitic, not tender. A stomach tube was passed. As the tube entered the stomach there was a rush of gas and dark green fluid that escaped from the tube with such force that the fluid stained the ceiling. I should say that there was not

over two pints of fluid, but the amount of gas was excessive. The stomach was washed out with warm water. The patient expressed immediate relief, and in half an hour she was asleep. An hour later the pulse was of good quality and its rate about 100. The epigastric tumor had disappeared. She had no further trouble and made an uneventful recovery.

My conclusions from this experience were that acute dilatation of the stomach is not always recognized; that unless recognized and promptly treated it may result in death. This experience also suggested certain inquiries. Why does this complication occur after some cases and not after others, and what is the mechanism of the process when it does occur?

The object of this study therefore is twofold.

1. To urge keeping in mind a relatively frequent complication, for treatment to be successful must be prompt.

2. To study the etiology and mechanism of the process, for rational preventive treatment will depend upon a clear understanding of the etiology.

This study is based upon the clinical observations of six cases of post-operative dilatation which it has been my fortune to see and treat in the private practice of Dr. F. B. Lund, as well as upon experimental work on living animals and on the cadaver, and upon a study of the literature.

ETIOLOGY.

Since the time of Rokitansky in 1842, there have been supporters of the view that acute dilatation of the stomach is primarily a mechanical process, due to compression of the duodenum at the point where it is crossed by the root of the mesentery, and the relation between acute dilatation of the stomach and the so-called mesenteric ileus has never been clearly understood.

On the other hand, the paralytic nature of the condition,

notably of some interference with the vagus nerves, has been considered since the time of Brinton.

Certain facts are worthy of consideration.

The transverse duodenum is normally firmly fixed behind, by fibrous tissue, and in front by the pressure of the overlying root of the mesentery and its artery. The calibre here is narrowed and the circumference flattened. This point is distal to the papilla of Vater, the point of entrance of the biliary and pancreatic ducts. Experimentally traction on the root of the mesentery will occlude the duodenum at this point. The weight of a dilated stomach by crowding the bowels down into the pelvis will also occlude the duodenum.

In one-third of the autopsy cases the duodenum, as well as the stomach, was found dilated with compression of the duodenum distal to the papilla, either by the root of the mesentery, by a distended stomach, or by a kink. Pyloric obstruction was found only five times in 120 autopsies.

Clinically, in the reported cases the vomitus was almost invariably bile-stained, but not fecal. This was true even in those cases which came to autopsy, and in which no mesenteric compression was recorded.

A consideration of these facts leads to the conclusion that in acute dilatation of the stomach the site of downward obstruction is usually distal to the papilla of Vater, but very high up in the small bowel.

That a dilated stomach favors the production of mesenteric compression, and that mesenteric compression favors the production of dilatation, seems also a fair conclusion.

The question is on the order of the mechanism. Does the dilated stomach secondarily produce obstruction in the duodenum, or does the duodenum become obstructed and result in gastric dilatation.

Assuming that it is impossible to dilate a hollow viscus when there is an exit for the distending medium, the essential factors in producing dilatation will be two:

1. Increasing contents.

2. Inability of the stomach to express its contents. The contents may be fluid, solid or gaseous, or all three. The stomach secretion, the secretions of the liver and pancreas, the excretion into the stomach of chloroform, or the frothy accumulations of ether which are swallowed, the post-anesthetic thirst, and the gaseous products of fermentation, are all factors in providing a distending medium.

The normal stomach can be distended, providing both orifices are closed and there is a distending medium.

Assuming that the distending medium is rapidly produced and that the stomach musculature is inert, it is fair to suppose that a considerable amount of distention might follow if there was only partial or relative obstruction of the stomach orifices. The problem is as to the nature of the obstructing factor.

My investigations lead me to believe that this factor is not a mechanical one, that the failure of the stomach to empty itself is due to paralysis of that organ combined with an obstructing factor which is not at first absolute, but relalative, and that this factor is itself primarly of paralytic origin, and finally, that mechanical obstruction when it does exist is secondary.

MECHANICAL FACTORS.

The evidence favoring compression of the duodenum by the root of the mesentery as the primary factor is equally conclusive that the compression is secondary. The evidence is entirely post-mortem evidence. The fact that traction on the mesentery or that the weight of a dilated stomach will occlude the duodenum does not count for the dilatation itself nor for the failure of the stomach to empty itself by way of the esophagus.

That occlusion of more than one orifice is necessary to produce dilatation is evident by certain clinical and experimental facts.

Acute dilatation is rare in chronically dilated stomachs where there is known pyloric obstruction. These stomachs protect themselves from overloading by vomiting. Acute dilatation is rare in mechanical intestinal obstruction even with reversed peristalsis. Here, again, the stomach protects itself by vomiting. Dogs in which the duodenum had been ligated were fed, and promptly vomited. There was no gastric accumulation when they were killed twenty-four hours later.

If compression by the root of the mesentery is the primary factor, why does not the condition more frequently recur after treatment? Is not the return to normal conditions after lavage suggestive that mesenteric obstruction if present was a result and not a cause? If a cause, it is still present to repeat the process.

Stied produced acute dilatation in dogs two weeks after gastroenterostomy, and both openings were found patulous at autopsy. Tuffier reports a case of acute dilatation occurring after gastroenterostomy, and at autopsy both openings were patulous. Acute dilatation occurred after gastroenterostomy in one of the six cases which I observed. Evidently the condition can occur without mechanical obstruction.

Assuming definite mechanical obstruction in the duodenum, another factor will be necessary to cause dilatation, namely, a failure of the cardiac orifice.

Assuming absence of mechanical obstruction, both at the cardia and at the pylorus, what condition must exist which is not primarily mechanical to produce an obstructing factor at both orifices? That condition must be inhibition or paralysis of the vomiting reflex, and inhibition of peristalsis, not only of gastric peristalsis, but of intestinal peristalsis.

FAILURE OF THE VOMITING REFLEX AND FAILURE OF PERISTALSIS.

Dogs in which the duodenum had been ligated vomited; but if the vagus nerves were divided as practised by Braun

and Seidel, the dogs were unable to vomit, and dilatation followed. But more significant, if the duodenum was not ligated, but if the vagus nerves were divided, enormous dilatation followed. Evidently paralysis of the vagus nerves not only inhibited vomiting, but inhibited peristalsis. In other dogs, if the duodenum was tied, and the testicle crushed as practised by Cannon and Murphy, enormous dilatation followed.

If the stomachs of conscious dogs were inflated, the stomachs emptied themselves. If the stomachs of narcotized dogs were inflated, they remained inflated. A few drops of ether locally in the stomach of dogs caused a cessation of peristalsis.

The experiments of Cannon and Murphy demonstrated that the splanchnic nerves are inhibitors of gastric and intestinal peristalsis, and they concluded that strong impulses through these nerves may be regarded as a cause of gastric and intestinal inactivity.

These experimental results favor the necessity of a paralytic factor in the production of acute dilatation, and this factor is most logically explained as paralysis of the vagus nerves or stimulation of the splanchnic nerves.

There are certain surgical factors which produce postoperative inactivity, trauma, cooling and exposure of the viscera, the presence of wicks, the development of peritonitis, over-stretching of the bowel, etc. Whether the source of inactivity is of central or peripheral origin, it seems impossible to say. Cannon and Murphy concluded that the effects of handling are not necessarily the consequence of reflex inhibitions from the spinal cord, but can be entirely explained as a disturbance of the local mechanism in the wall of the gut. The occurrence of acute dilatation so frequently after operations on the biliary tract, and the fact that recurrence may take place until the drainage materials have been removed, suggests that the wicks are a cause of

local paralysis. Such a recurrence occurred in one of the six cases in this series.

On the other hand, the occurrence of acute dilatation after operations on parts of the body not connected with the abdomen, as after enucleation of the eye, suggests a reflex cause.

Furthermore, if local trauma plays such a part, acute dilatation should be more frequent after operations on the stomach itself, whereas it is rare.

Kelling has expressed the belief that narcosis is the chief factor in producing the primary paralysis in these cases, a view that has not met with general acceptance. At present I believe that his conclusion is logical.

The evidence of two clinical facts is certainly significant, namely:

1. A certain amount of paralytic distention follows general anesthesia. This is not local distention of the parts operated on, but general distention.

2. There are no recorded cases of post-operative dilatation where general anesthesia was not used.

THE RELATION OF ACUTE DILATATION OF THE STOMACH TO MESENTERIC ILEUS.

Some explanation is due to account for the finding of duodenal compression by the root of the mesentary at autopsy. Some explanation is also due to account for the bile-stained vomitus and the absence of fecal vomiting — a fact which shows the location of an obstructing factor high up in the bowel, but distal to the papilla of Vater. It has also been concluded that mesenteric obstruction if present is secondary, and it is therefore necessary to account for a primary obstructing factor. The primary obstructing factor is to be found in the paralyzed bowel. Acute dilatation of the stomach is not a local paralytic process, but a general alimentary paralysis of which the stomach is but a part. The paralytically distended bowel is relatively an obstructed

bowel. That any distended bowel presents many kinks is a well-known clinical fact. With an active peristalsis these kinks will be obliterated as the peristaltic wave moves over them. In the absence of peristalsis they will not be obliterated, and there exists a series of partial obstructions in a long tortuous tube—a condition seen frequently in those cases of intestinal paralysis due to peritonitis, where, upon opening the bowel, only one loop is drained. Hence, an inactive bowel is an effective obstruction to the passage of gas, fluid or solid. The stomach, too, has lost its peristaltic action, and in its weakened condition is unable to overcome the relative obstruction offered by the paralyzed bowel and distention increases. If now the fixity of the transverse duodenum, at the point where it is crossed by the root of the mesentery, which is the only absolutely fixed portion of the gastrointestinal tract of small calibre, will be recalled, the conclusion of Nicholls with reference to this point will be appreciated. "We can conclude then there is what may be termed a physiological tendency to obstruction, and, moreover, to constriction at the terminal portion of the duodenum, a potentiality that may become an actuality from an apparently trifling cause." The comparative freedom of motion of the ascending and descending duodenum should be remembered. Theoretically the production of a kink at this point should be easy in the absence of peristalsis. In the cadaver I found it easy to occlude or partially occlude the duodenum at this point by distending the stomach with fluid or air; and, what is also of great importance, a moderate amount of distention of the small intestine produced the same effect and caused a kink which obstructed the duodenum at this point. From these facts it is fair to assume that distention of the stomach or bowel, or both, need not proceed very far before mechanical obstruction is produced at this point, and the "potentiality" becomes an "actuality." The process should now become a rapid one, and clinical

observations and autopsy observations prove that it is. The condition now is one of paralyzed stomach, absolute obstruction at the distal outlet of the stomach, and paralyzed vomiting reflex. The contents, however, are constantly increasing. With the increase in contents comes increased paralysis of the stomach wall from over-distention. With the increased size of the stomach comes a tendency to increase the obstruction already present.

Assuming that the contents continue to increase and treatment is not instituted, why does the stomach not go on to bursting? I have not been able to find an instance where this happened. With the conditions which now exist in the duodenum, exit of contents seems impossible. At the cardia the condition is different. Here is a spasmodic closure of the orifice, not by a kink, but by a muscular valve. As distention progresses this muscle is put under strain. It becomes fatigued and dilates a little. The result is leakage, not vomiting,—exactly the condition which obtained clinically in these cases.

Conner has referred to the enormous amounts of fluid vomited. This did not occur in the cases in this series, and I find that most writers support the view that the vomitus is small in amount and is not vomited, but wells up. The action of the cardia here is like a safety valve. It seems, then, that any case of acute dilatation may finally become mesenteric ileus if the paralysis is of sufficiently long duration.

CONCLUSIONS AS TO ETIOLOGY.

On the evidence, then, I believe that the occurrence of acute dilatation of the stomach cannot be explained on a purely mechanical basis. The essential factor and the primary factor is paralysis, not of the stomach alone, but a general alimentary paralysis of which the stomach paralysis is but a part. The manifestation of stomach symptoms is due to the anatomical relations and position of the stomach,

which have already been mentioned. The obstructing factors are the paralyzed bowel and the paralyzed vomiting reflex. The source of paralysis seems most likely of central origin, and probably due to narcosis, but with probable contributing peripheral injury.

That the paralysis must be largely fatigue seems apparent from the fact that it is transitory. One relief of the distention usually causes a return to normal conditions.

The occurrence of acute dilatation following anesthesia will depend upon the degree of the subsequent gastrointestinal inactivity, this inactivity varying in different patients according to their individual resistance, from a slight fatigue to exhaustion or absolute paralysis.

Prolapsed viscera and deformities of the spine, causing distorted anatomical relations, as well as a stomach weakened from previous disease, may be contributing factors.

Mesenteric ileus may be a secondary result of acute dilatation, but mesenteric ileus *per se* is mechanical intestinal obstruction. Acute dilatation of the stomach is an acute paralytic process related to mesenteric ileus only as a possible precursor of the condition.

The Diagnosis in these cases is not difficult if the condition is but kept in mind. Prolonged bile-stained post-anesthetic vomiting, or vomiting coming on twelve to thirty-six hours after operation in the absence of reasonable cause, especially the frequent welling up of small amounts of bilious fluid without subjective relief, together with distention either general or epigastric, and a feeling of intense fulness and pressure in the epigastrium, should lead one to suspect the condition, and the stomach tube should be passed. Its use should not be delayed until the case becomes "typical," when the patient will be in collapse. Not all of the symptoms will present in every case, and they will vary greatly in severity. The overflow vomiting is the most characteristic sign.

The Prognosis in recorded cases with typical symptoms is bad; the mortality is from 60–72 per cent. This represents the mortality of unrecognized and untreated cases. If the cases are recognized early and treated at once, the prognosis is good. The six patients in this series all recovered.

Treatment.—Active treatment is directed to the relief of paralysis and to the promotion of perstalsis by the evacuation of the gastrointestinal contents by means of the stomach tube and the rectal tube. Saline enemas by the "seeping method" should be given to restore the fluids lost by transudation.

Treatment by posture, the knee chest position, ventral decubitus, etc., with the intention of taking the weight of the distended stomach from the duodenum, seems hardly indicated in the cases of acute paralysis following laparotomy, especially if the stomach tube is available. Morphine, although an inhibitor of peristalsis, should be given, as the paralyzed tract needs rest rather than stimulation, and by rest will more quickly recover its normal tone.

Operative procedures are not indicated. Gastrotomy accomplishes nothing that the passage of a stomach tube will not accomplish. Gastroenterostomy accomplished nothing because it is not a drainage measure. Attaching a paralyzed stomach to a paralyzed bowel does not empty the stomach or the bowel. Both operations add to the paralytic condition already present.

Prophylactic treatment is directed to the minimization of operative trauma and anesthesia.

In conclusion, acute dilatation of the stomach is of comparatively frequent occurrence after surgical operations; the cases vary greatly in severity. It is presumable that many mild cases which occur in patients having a stormy convalescence get well without treatment, and it is also presumable that many deaths following operation where the cause is

not understood are the result of this complication. Its occurrence cannot be forecasted; but I believe the key to the problem is to keep the condition in mind; and if this is done, and if the cases are recognized early and treated at once, there will be fewer interesting autopsies to determine the cause of death after some operative procedures.

DISCUSSION OF PAPERS OF DRS. CODMAN, HOUGH AND SMITH.

Dr. J. C. Munro, of Boston: These are three splendid papers, and I think it is a great pity that more of the Society were not here to hear them. My remarks will be mostly about Dr. Codman's paper, as I am put down to discuss his subject. I cannot criticize, because I think he has covered the ground thoroughly. It seems to me that he has given a clear picture of duodenal ulcer. There are only a few points which I wish to bring up. He spoke of alcohol being a cause of this condition. I do not think it has anything to do with it. We have had enough teetotalers with ulcer to prove that alcohol has nothing to do with it.

He spoke of healed ulcers. We see cases at the Carney Hospital where there are scars present, the ulcer itself having healed long ago and the patient coming to us for other trouble for which we have operated, so that I think some ulcers do heal spontaneously. But I think it is unwarrantable in most cases to trust to their healing by medical means. I have always believed, and the more I see of duodenal ulcer the more I believe, that they are surgical.

In regard to making a diagnosis between duodenal and gastric ulcer, it cannot always be done, because the two often coexist. It is common to find a duodenal ulcer in one stage of existence, and perhaps one or two gastric ulcers in another stage. The duodenal ulcer may be so quiet that it causes no definite symptoms, while the gastric ulcer is active. Another thing that we sometimes forget is the fact that the duodenal ulcer creeps toward the pylorus as time goes on. It may heal from behind, while advancing toward the pylorus, and in these cases, in the later stages, we may find carcinoma of the gastric mucosa. We have never seen a case of true carcinoma of the duodenum. Mayo has seen two or three, but they are very rare.

Dr. Codman speaks of pain as being of diagnostic value. It is valuable in determining duodenal ulcer. The patient often says it has no reference to food, because it comes on about eleven o'clock in the morning, at four or five in the

afternoon, and at midnight; and because if he takes a drink of milk or eats a cracker the pain goes away. This is so common that time and again we make a diagnosis of duodenal ulcer simply from the sequence of the pain — eleven in the morning, four in the afternoon and at midnight. Whether you find bleeding or any other symptoms, pain at these times is very suggestive. But, on the other hand, this symptom is not always pathognomonic. There is, for example, a type of case of which we have had a number in the last few months. They have been under close observation on the medical side, and under independent examination both the medical and surgical observers have come to the same conclusion independently; that is, that the case is a duodenal ulcer without question—there is blood, the pain comes on at certain times, and so on. We operate and find that there is absolutely no sign of a duodenal ulcer, nothing but chronic appendicitis. On the other hand, we have cases that we think cannot possibly be a duodenal ulcer. The history all points to chronic appendicitis. We operate and find a normal appendix and an active duodenal ulcer, for which, of course, we do a gastroenterostomy.

There is still a third type, that is, an ulcer at the esophageal end of the lesser curvature. We may find the usual symptoms of pain at certain times, hemorrhage in the stools, some vomiting of blood, a history typical of duodenal ulcer, yet we may find an ulcer at the esophageal end of the lesser curvature, having nothing to do with the duodenum. So I do not believe that we can always make a definite diagnosis of duodenal ulcer. We can examine these cases all we want to and make all the tests we please, but after all is said we must look in to the abdomen before we can make an absolute diagnosis. I am sure that we cannot always tell cases of typical duodenal ulcer from cases of chronic appendicitis or from a rare case of ulcer of the gastric mucosa, and when men waste their time trying to locate an ulcer within a fraction of an inch, I think they are juggling with something outside their business.

Of course, in the earlier operations many duodenal ulcers were called gastric ulcers, because up to within a few years the exact anatomical boundary was not known until Mayo discovered it. I know in my own cases that in our early work on the stomach we called certain cases gastric ulcer

because we felt something below this ulcer which we thought was the pylorus. The pylorus was proximal to the ulcer all the time, but we did not recognize it. But if we bear in mind the landmarks which Mayo has given and which are plainly visible in eight out of ten cases, then we have an exact idea of the location of the ulcer.

Is there any objection to operation in a case of duodenal ulcer? There is absolutely none. Rarely is a patient not relieved by a gastroenterostomy, and where this is done and done properly, and where there is a gross lesion—a lesion that can be seen and felt—98 per cent. will be relieved or entirely cured, and the fear of post-operative disturbances need not concern us. We now have cases of five and six years' duration which are entirely well.

I was very much interested in Dr. Hough's paper. I am going to try his test. He wrote an article on the same subject a few years ago and we followed his suggestion, but not properly, and our results were not good enough to encourage us. I am going to try it again. It is apparently in line with Dr. Harris's recent work in dysmenorrhea.

Dr. Smith's paper is also very interesting. We have not solved the cause of acute dilatation of the stomach at all, I believe. We see more or less of it in our work. We used to call it acute intestinal obstruction, and we believed that patients died of that, but instead some died of acute dilatation. Finally we got it into our heads that if we washed the stomach out the patients recovered, and I think the remark of Mayo at Atlantic City last week ought to be hung up in our hospitals. He said that they tell their house officers at Rochester to carry stomach tubes instead of stethoscopes around their necks; and there is a heap of wisdom in that remark. A very large proportion of our abdominal cases have their stomachs washed out at some time after the operation. I do not mean to say that they all have acute dilatation, but if they have nausea that persists we wash their stomachs out. Occasionally we have a case like those described by Dr. Smith, and if we get the fluid out of their stomachs early they get well. The mechanical causation is a fascinating theory, as is the theory of the fibrous band from the diaphragm, etc., but mankind has been walking on two legs for thousands of generations, and these cases of acute dilatation are extremely rare, almost always occurring

after a severe shock, such as an operation. I do not believe it is always explained by the constriction of the duodenum by the mesenteric vessels. It seems to me that the theory of Maury of New York is an interesting one in this connection. He has been at work on the essential secretion of the duodenum, and he believes that death in acute intestinal obstruction is caused not by the obstruction, but by some toxic substance, a secretion, and it may be that these cases of acute dilatation of the stomach are caused by the same toxic secretion, because the patient is always overwhelmed by a severe toxemia from the first. He is knocked out within six to twelve hours after onset, and if we can get his stomach free of its contents early he gets well rapidly.

Dr. Farrar Cobb, of Boston: I think that Dr. Hough's admirable paper is important as adding to our knowledge of the diagnosis of those abdominal diseases which most often present the grave surgical emergencies. It is important for all surgeons to bear in mind that certain uncommon pathological conditions can cause the same localized symptoms and signs by which we are accustomed to diagnose common diseases, and in certain of such cases a correct diagnosis may be impossible without exploratory operation. For example, appendicitis and cholecystitis can be exactly simulated by acute hæmatogenous infection of the right kidney. In a number of instances such cases of renal infection have been diagnosed and operated upon as appendicitis. It has twice fallen to me to make this mistake because of the localized pain tenderness, muscle spasm and high leucocyte count with no positive evidence of disease of the kidney. Again, hæmatogenous infection of the left kidney can give exactly the same localized signs as perforation of the stomach or intestines. I have reported two such cases recently. In these cases of kidney infection, unless there is tenderness at the costo-vertebral angle or presence of pus or blood in the urine, with or without a history suggestive of stone in the kidney, diagnosis may only be made by exploration.

As is well known, cases of right-sided pneumonia or pleural infection may give localized signs of appendicitis, and a number of such cases have been operated upon under this mistaken diagnosis. This mistake is especially likely

in children. What may not be so well known is that a left-sided pleural infection may give rise to signs of appendicitis, pain, tenderness and muscle spasm, to the right of the median abdominal line. On my last service at the hospital I was convinced that an empyema on the left followed appendicitis with a walled-off abscess, because of the local signs on the right, that after draining the empyema I opened the abdominal cavity to find nothing pathological. The lesson in such cases is to always examine the chest in suspected cases of appendicitis, especially in young children.

Upon analyzing quite recently my own cases of ruptured tubal pregnancy, ten in number, and all the cases in the Massachusetts General Hospital for the last ten years, I was surprised to find what a large percentage of the cases had localized signs of peritoneal infection simulating cholecystitis, appendicitis or intestinal perforation. That is to say, that many of the cases could have been diagnosed as peritoneal infection were it not for the signs of hemorrhage. In over one half of the cases there was pain and tenderness and muscular spasm remote from the pelvis associated with nausea and vomiting, a high leucocyte count and moderate fever, and while it is true that in most of the cases the signs of hemorrhage sooner or later made a diagnosis clear, on the other hand, in the early stages a diagnosis of acute infection might readily be made.

I have been much interested in what has been said about diagnosis by finding areas of local hyperalgesia. Personally, I have little confidence in this method, and should be sorry to have the rank and file of the profession attach much importance to it. The relative value of localized muscular spasm in peritoneal infections is of greater diagnostic importance than localized tenderness, hyperalgesia or complaints of pain. In certain cases pain and tenderness may be slight, while the spasm of the abdominal muscles under a trained surgical hand reveals the seriousness of the infection. This is notably so in appendicitis and other peritoneal infections in children and in fat adults, especially men. Appendicitis is very frequently atypical in the signs and symptoms in children, and in large fat men the gravity of the intra-abdominal condition can best be estimated by the spasm rather than by pain and tenderness or fever.

Dr. J. C. Hubrard, of Boston: It seems to me more proper to consider post operative dilatation of the stomach as a symptom of a condition rather than a distinct disease. Acute dilatation of the stomach occurs, without doubt, from several causes. Of the many etiological factors to which it has been assigned, those which seem most probable to me are a pressure of the superior mesentery artery upon the duodenum, causing what is celled gastro-mesenteric ileus and some disturbance of the enervation of the stomach itself, affecting either the centres of the brain or the cord or the nerve paths connecting them with the stomach.

In a number of the cases of gastro-mesenteric ileus, at autopsy no evidence of any pressure from the vessels upon the duodenum has been demonstrated. This, I think, can be explained by the absence of any blood pressure in a person after death, the absence of the pressure in the artery, necessarily, doing away with the pressure upon the duodenum. The explanation of the unsatisfactory character of the autopsies in these cases was first, I think, suggested by Dr. Codman. However, whatever the etiology, the real trouble in acute dilatation of the stomach is a motor insufficiency, the walls of the stomach failing to force along contents. Stagnation necessarily ensues; fermentation goes on, increasing the dilatation and lessening the motor power of the stomach. A vicious circle is thus established.

The treatment is both preventive and active. Practically the preventive treatment comes down to an ability to perform an operation with the least possible handling of the stomach and intestines. The less the manipulation, the less the temporary paralysis and motor insufficiency. While the preparation of a patient for operation in the way of diet is spoken of as important to prevent the post operative dilatation, it seems to me that the factor over which a surgeon has the greatest amount of control is the handling of the intestines. Were the preparation of a patient before operation so important an etiological factor, it seems to me that in the emergency surgery, where there is no preparation whatsoever, acute post dilatation would be more frequently met.

The active treatment consists in the free and frequent use of the stomach tube. A gastro-enterotomy or any further operation upon the stomach itself appears to me inadvisable.

At the least suggestion of the presence of the condition, a stomach tube should be passed. It may seem to those who have not used it, post operative, that to wash out the stomach of a patient who has just gone through a severe laparotomy is a pretty serious and disturbing manœuvre. I confess it is with some misgivings that I myself at first used the stomach tube, but, as far as I can see, it is no more distressing than to a person who has not been operated upon. It is a comparatively simple matter to pass the tube with the patient lying down. It is not necessary for him to sit up. The washing of the stomach apparently causes no shock, and the end result is so preferable from the patient's point of view to the condition for which the tube was passed, with its frequent vomiting of most unpleasant stomach contents, that I think the patient feels that he is well repaid for the disturbance.

The prognosis of acute post operative dilatation of the stomach untreated is exceedingly bad. I think that it is only by a matter of chance that an untreated case could get well. When treated before the condition has gone too far, there is no reason why all the cases should not recover.

The diagnosis is not difficult when one bears the condition in mind. I, personally, am not quite sure that I have had any cases of post operative acute dilatation of the stomach, partly because I have grown to consider a stomach tube as a very important instrument (if it may be called such) in the treatment of the convalescence of surgical cases. Therefore, when a paitent continues to vomit, post operative, longer than it seems to me proper, I have recourse to the stomach tube. I will briefly cite the facts of some of the cases whose stomachs I remember to have washed after operation:

A man of middle age, who had been operated on for an acute appendicitis, after the operation began to vomit small amounts frequently. The vomitus became dark colored. The picture resembled that of general peritonitis and the prognosis seemed most grave. His stomach was washed out; and, as I remember it, he vomited no more, and recovered.

Another case was that of an elderly woman who had had a complete hysterectomy for cancer of the uterus. She continued to vomit a little bit every day for several days.

She was gradually losing ground, and I felt that if something were not done, she would, undoubtedly, die. I therefore washed out her stomach, and she made an uneventful recovery.

Within a week I operated upon a man for strangulated hernia. Following the operation there was some distension of the abdomen which persisted in spite of the fact that his bowels were moving. On the third day the distension in the epigastrium became greater. The man began to complain bitterly of thirst and to vomit frequently small amounts of greenish fluid. His stomach was washed out. It contained a great deal of gas and at least a quart of bile-stained liquid. Although at the end of the washing the epigastrium was still distended, he vomited only two or three times in the next twelve hours and went along with a normal convalescence.

All food by mouth was, of course, omitted in all the above cases after the stomach was washed. It is interesting to note that two of the cases were emergencies and that there was no preparation in the way of diet before the operation.

In closing I would like to lay stress on the importance of the use of the stomach tube, and on the advantage to be gained by using it early and frequently rather than waiting until a definite motor insufficiency has occurred.

Dr. R. B. Greenough, of Boston: I have seen one case of acute post-operative dilatation of the stomach four or five years ago in a patient operated upon by another surgeon about a week previously for hysterectomy. She had vomited for two days, and the symptoms were those of high intestinal obstruction. I operated, and found the obstruction was entirely above the pylorus,—in fact, the small intestine was collapsed. I washed out the stomach and got a large quantity of offensive fluid. The patient was moribund at the beginning of these procedures, and died in a few hours. I think Dr. Smith's suggestion of mesenteric ileus as a phenomenon which develops secondarily is one of considerable interest.

Another case of acute dilatation of the stomach developed in a girl of fourteen who had had a plaster jacket applied for scoliosis two weeks previously. She was comfort-

able for about a week and a half, when she began to have general abdominal symptoms, vomiting in small amounts. Her physician removed the jacket, but her symptoms continued, and she was brought into the hospital. She had an intense toxæmia at that time, with a pulse of 130, and rapid respiration. Her distention was distinctly epigastric. I started to operate, when it occurred to me that it was a case of acute dilatation of the stomach, and not one of intestinal obstruction, as I had at first supposed. Without opening the abdomen the stomach was washed out, two quarts of fluid and an enormous amount of gas being obtained.

In both these cases there was "overflow" vomiting and intense toxæmia, which seem to be very-characteristic symptoms.

Dr. E. P. Joslin, of Boston: I have seen two cases of acute dilatation following the application of plaster casts, with recovery only after the use of the stomach tube. Practically nothing did any good until the stomach tube was used. It is especially easy to wash out the stomach in acute dilatation following operation, because, as a rule, the patient has been given liquid food, and probably not much milk. We really do not need to wash out the stomach. Introduce the tube, and simply allow what is in the stomach to run out. Not pour in large quantities of water—get out the fluid as quickly and easily as possible, and, if necessary, use the tube again, but not too often.

I have seen other cases of acute dilatation of the stomach in connection with the beginning of diabetic coma. That is a very ready source for such a condition, because the patient is very thirsty and the doctors are anxious to get in plenty of soda; in consequence, enormous quantities of liquid are drunk, dilatation ensues, and the coma goes on to a fatal termination; whereas, if the liquid had been given by rectum as well as by the mouth, time would have been saved and the patient might have recovered. We physicians are apt to forget what is every day knowledge to the surgeons, that patients will take large quantities of water by rectum in a few hours.

The writer of the paper on acute dilatation of the stomach speaks of leakage rather than vomiting in these cases. It is a most expressive term.

The statistics of mortality, I think, are of little value. The reader states that all his cases recovered, whereas the general mortality is said to be from 60 to 70 per cent. If one is early enough with the treatment, as has been said this afternoon, I am sure many cases will recover.

Etiological treatment.—Whereas surgeons do well in feeding patients after operation with small amounts of liquid, they often err by increasing the liquid quantity of diet rather than by changing over to thick liquids or simple solids. Solids are often borne better than liquids, and their use would be good prophylactic treatment.

The papers have all been so interesting that one cannot resist making a few observations upon them. The diagnosis of duodenal ulcer—I do not believe we can always make it. I have seen a case called ulcer of the duodenum where it was appendicitis, and another where an operation was done for appendicitis and it proved without question to be duodenal ulcer. I can match the errors of others with an equal number of my own. I have twice made a diagnosis of gall stones in women above the age of 65, and both of them had duodenal ulcer, and the cases had both been very carefully considered. I think the diagnosis is often difficult. The X-rays do not help as in gastric ulcer and cancer. One thing that impressed me at Atlantic City last week above all others was the diagnostic value of the X-ray. There is no question but what you surgeons, and certainly we medical men, are away behind the times in this respect. We have men in Boston who know how to use the X-ray for the diagnosis of gastric diseases, and it is our own fault if we do not take advantage of their skill.

The surgeons have taught us how to make the diagnosis of duodenal ulcer, but they have not told us how to treat it. I should like to know what the surgeons would say in a case of duodenal ulcer where there is not the slightest sign or symptom of stasis. What are we to do where the patient has to the best of our knowledge a duodenal ulcer but never vomits? Shall we advise operation in these cases? One case which I have followed this year had one severe hemorrhage, but no stasis; in three months he was better, then another hemorrhage; he has gone through another course of treatment for six months, and is well apparently; but it is understood by him and his medical advisers that any sign

of further trouble means operation, yet he has no stasis. The medical treatment in this case illustrates my idea of treatment,—rest, no irritating food, and finally, nourishing food so that his strength is kept up. Our surgeons here in Boston are just as good as anywhere else, but we know that all gastroenterostomies do not turn out well. There is no question that one should always consider the case very thoroughly and I believe advise surgical treatment more commonly than at present, but in patients presenting normal digestive motility only with great deliberation.

Dr. Franklin W. White, of Boston: I am glad to speak briefly of two points in Dr. Codman's paper. I have noticed the change in the statistics in the last few years in regard to the frequency of duodenal ulcer compared with gastric ulcer, and we must believe that duodenal ulcer, instead of being relatively uncommon, is common. Mayo reports 60 per cent. of the peptic ulcers which he finds at operation are duodenal.

I was interested recently to look up the post mortem records of ulcers at the Boston City Hospital. In contrast with the older post mortem statistics, which give only two or three per cent. of duodenal ulcers, we found 34 per cent. of duodenal ulcers in a series of fifty cases. I cannot explain why the per cent. of duodenal ulcers found at operation is so much higher than that found at post mortem examination, unless it means that duodenal heal more readily than gastric ulcers.

The other point is in reference to the diagnosis of duodenal ulcer. The question whether or not we can diagnose the exact position of a peptic ulcer is a very interesting one. This is not a new question; it has been seriously considered by the leading clinicians, and Dr. Codman does not ask us to decide it in a new way, but by the good old-fashioned method of the patient's symptoms. I think the answer is that we are in doubt in the large majority of cases. We must remember the location of peptic ulcers. The large majority of gastric ulcers are close to the pylorus, and duodenal ulcers are usually found within one-half inch to one inch below the pylorus. Can we by symptoms tell exactly where these ulcers are to the one-half inch or inch? I think it is doubtful.

Dr. Codman has laid much emphasis on the lateness of the pain after food—the so-called "hunger pain"—in the diagnosis of duodenal ulcer. We must remember that there are two types of pain in any peptic ulcer wherever located,—an earlier kind associated with mechanical irritation of food and a later (probably more frequent and important) kind due to the irritation of the acid secretion. In cases of simple hyperacidity, we know that the distress or pain comes late after food, at the time when most free acid is present in the stomach; and if this is true where the mucous membrane is unbroken, how much more will it be true in the presence of a gastric ulcer at the same time and for the same reason. I believe Dr. Codman has over-estimated the value of late pain in the diagnosis of duodenal ulcer.

Dr. Graham of Rochester, after examining hundreds of ulcer cases, and seeing them operated upon later by the Mayos, says: "If you follow patients from the examining room to the operating room you are forced to the conclusion that to locate a peptic ulcer is not only very difficult, but often impossible."

ARTICLE XXVII.

THE SERUM DIAGNOSIS OF SYPHILIS.

By FREDERICK P. GAY, M.D.
OF BOSTON.

READ JUNE 15, 1909.

THE SERUM DIAGNOSIS OF SYPHILIS.

We know that animals react to the injection of various foreign protein substances, such as bacteria and red blood cells, by producing substances known as antibodies which may be detected in their blood serum by certain appropriate methods. Following the injection of red blood cells, the antibodies or hemolysins which are formed, endow the treated animal's serum with the property of destroying the red blood cells that have been used for injection. The properties of the antibodies that result from infection or immunization with bacteria vary, depending on the species of bacterium that is employed. We know from the work of Pfeiffer, Bordet and others, that animals that have been given injections of cholera vibrios produce substances in their blood (bacteriolytic immune bodies), which, in the fresh serum, have the property of destroying the cholera vibrio, as is shown by a granular change in the organisms and their failure to grow on culture media. It is unfortunate that not all the sera resulting from the injection of bacteria are endowed with such destructive properties, for as we know, the majority of such antibacterial sera do not have the property of destroying the causative organism. This failure to destroy is due primarily to a resistance of the organism in question rather than to the failure of the animal that has been immunized to produce an antibody. We know, indeed, from the work of Bordet and Gengou that antibacterial sera in general, although they produce no morphological change in the organism that has given rise to them, do, however, give a characteristic reaction with the organism concerned. They form a complex with the organism which is never formed with the serum of untreated

normal animals. This complex is endowed with a property of fixing the alexin (complement) of fresh normal serum, that ferment-like substance, which in the case of the destruction of the cholera vibrio is the essential destroying element, but which, however, acts only in the presence of the suitable specific immune body.

This reaction between an antibacterial serum and the causative bacterium which leads to alexin fixation, and gives the reaction of fixation as it is called, has led to the modern serum diagnosis of syphilis. In 1906, Wassermann, Neisser and Bruck described a new reaction which occurred between the serum of syphilitics and a watery emulsion of fetal syphilitic liver. This fetal liver causes a reaction of fixation for alexin in the presence of syphilitic serum, but produces no such reaction with the serum of normal individuals or those suffering from other diseases. It was at first supposed that the liver emulsion acted as an antigen because it contained large numbers of the Spirocheta pallida, which, of course, could not be obtained in pure culture, and the reaction was reasonably supposed to be due to a combination between antigen and antibody in the manner that has already been described. As we shall later see, the present conception of the reaction is not precisely the one which was originally thought of by Wassermann, but its utility has been convincingly proved and its accuracy determined in thousands of cases.

In an article by Jones which attempted to cover all the literature that has appeared on this serum reaction for syphilis for the past three years, 220 articles were collected, but it is certain that this by no means includes all the contributions to the subject. Many thousands of cases of syphilis have been tested by this method, as well as a large numbers of control cases, for the purpose of determining the accuracy of the diagnosis. I may mention, off-hand, a compilation of estimates made by some dozen observers which

I have chosen at random, whose observations cover from four to five thousand cases of syphilis. The individual variations in a technic which is as complicated as is this reaction must of necessity be considerable, and yet it is surprising to find how great the uniformity of opinion is as regards the accuracy of this means of diagnosis. These dozen observers to whom I refer, have given estimates of the diagnosis in the various types of syphilis in the following percentages:

Primary syphilis. Highest estimate of positive percentage of reaction, 100%; lowest estimate, 48%; average estimate, 70%.

Secondary syphilis with symptoms. Highest estimate, 98% positive; lowest, 79%; average, 90%.

Secondary syphilis without symptoms. Highest percentage, 80%; lowest, 60%; average, 70%.

Tertiary syphilis. Average percentage, 71%.

General paralysis. Highest estimate, 100%; lowest, 63%; average, 81%.

Tabes dorsalis. Highest estimate, 77%; lowest, 56%; average, 67%.

These observers have likewise examined about six hundred control cases from normal individuals and from those suffering from other diseases, and with the exception of two diseases, scarlet fever and leprosy, all other cases have uniformly given a negative reaction.

A consideration of these results, which, to repeat, represent only a fraction of the data that have been accumulated and have been chosen at random, shows how highly accurate this method of diagnosis is. It also shows that the reaction, although not absolutely specific, inasmuch as it occurs in leprosy and scarlet fever, is certainly of great clinical diagnostic value. Putting aside these two diseases, scarlet fever and leprosy, and possibly certain other infections which are rare in this country, as trypanosomiasis, we

may feel sure that when we obtain a positive Wassermann reaction we are dealing with syphilis and with no other disease. A negative reaction is, however, of less significance from an absolute diagnostic standpoint.

The diagnosis of syphilis is not, as a general thing, difficult, but there are always certain doubtful cases in which a corroboration by means of this test would be highly important. I believe, however, that the future utility of the test will be largely as indicative of the continuation or suspension of treatment in the disease. It has, indeed, been shown by all observers who have studied the reaction carefully, that cases of syphilis that have been vigorously treated with mercury gave a reaction in a much smaller percentage of cases than do the untreated cases. Citron, for example, obtained 81% of positive results in his cases of untreated syphilis, whereas only 65% of treated cases gave the reaction. Bruck and Stern obtained 81% in untreated cases, and only 28% in treated cases. Other observers have found that cases that gave a positive reaction, after vigorous treatment for a time fail to give the reaction, and in certain instances when the treatment was suspended, again give it. In other words, the degree of positiveness in the reaction is a direct indication of the acuteness of the infection. It has also been shown to vary directly with the duration of the disease and with the number of its symptomatic recurrences.

This leads us to consider the exact nature of the reaction itself as we now regard it. As I have already mentioned, it was at first supposed by Wassermann, and, indeed, by most others, to be due to a reaction of fixation, purely speaking; that is to say, to a reaction between antigen, that is, the syphilitic virus in the fetal liver, and antibody (serum of the syphilitic). Such a reaction would imply the absolute specificity not only of the antibody, which, with the exceptions mentioned, would seem to have been determined by subsequent investigation, but also of the antigen. It was found,

however, that a similar watery or even an alcoholic suspension of *normal* liver would serve as well for the diagnosis as the original watery suspension of syphilitic liver employed by Wassermann. It was later shown that various lipoid substances, and particularly lecithin, could be employed instead of liver extract. These substances obviously have no specific relation to the Spirocheta pallida, the cause of syphilis, and our present standpoint in the matter is, as Wassermann himself expressed it, that the reaction is due probably to a combination of a toxin produced by syphilis and lecithin, which forms a colloid that has the property of absorbing alexin. We know from work on the known colloids that these substances frequently have such properties. Citron has suggested "Luesreagin" as a name for this toxin formed by the process of syphilis in the body. It has been shown by certain observers that the serum of syphilitics has an increased lipolytic power, and Peritz has shown that there is an increased output of lecithin during certain forms of syphilis. It would seem then quite probable that the syphilis toxin splits off lecithin from the organs and leads to its elimination from the body.

Numerous tests in the nature of precipitin tests and the like have been suggested for syphilis, but none of them have shown the accuracy and specificity of the Wassermann test and certain of its modifications, which have led to a simplification in its necessarily complex technic. Whereas these other tests do not seem to have proved themselves as of greater diagnostic value, the work of Klausner and of Noguchi, which has proved the marked increase of the globulins in syphilis, is, in itself, of great theoretical interest.

In conclusion, we may say that we have in the Wassermann serum test for syphilis a biological reaction which is at least as accurate in point of view of diagnosis as is the Widal test for typhoid fever, and which may in the future prove to be of far greater value in prognosis and as an indication for treatment.

DISCUSSION.

Dr. Wm. P. Boardman, of Boston: In my short series of 182 cases examined, I have used practically no modification of the original technique of Wassermann except in regard to the antigen or extract employed. Except in a few of the earlier cases, I have used an alcoholic extract of normal human liver; guinea-pig's heart and liver were used in a few cases, but the amount obtained of the extract from these small organs was so small that I soon gave them up, although they seemed to work very well. Human heart (alcoholic extract) also was tried, but it is a little more difficult to prepare. Lecithin (Merck's) did not prove satisfactory in my hands. The percentages obtained with an alcoholic extract of normal liver, as will be seen from my figures, do not vary materially from those obtained by other authors with fœtal syphilitic liver extracts, except that they are a trifle lower in the number of positive reactions. The validity of a positive reaction seems to be in no way impaired.

The patient's blood was obtained, in almost all the cases, by puncturing the ear. In a very few cases it was obtained by venous puncture. 1.5 cc. of blood is needed for the test. In five cases cerebro-spinal fluid was used.

Following the suggestion of Gross and Volk,* to the effect that it is not necessary to heat the patient's blood for one-half hour to destroy the complement, I tried the unheated blood in 40 cases. The results of the unheated and heated blood coincided in 29 of these cases. In the other 11 cases, 10 reacted positive with the unheated blood and negative with the heated, including cases of epilepsy, typhoid, rheumatism, sepsis, tabes, and questionable tertiary syphilis, and one case was negative with the unheated and positive with the heated (tertiary syphilis). As several of the cases with a positive reaction with the unheated blood showed nothing in the history to suggest syphilis, it seems to me that the above author's suggestion is of no value. I found that the blood exhibited no change for 24 to 36 hours if kept near the freezing point, but results taken from blood

* Wiener klinischer Wochenschrift, v. xxi, No. 44, p. 1524.

older than this showed that some positive ones became negative, and the reverse was also occasionally true.

The complement in the guinea-pig's blood lasted for about six days if kept at a nearly freezing temperature, but diminished after that, slowly at first, and soon entirely disappeared. I, therefore, never used it after five days.

Of the amboceptor from immune rabbit's serum I used continually three times the unit dose found necessary by titration to cause hæmolysis in one-half hour. This is much preferable to a smaller dose as it prevents the occurrence, in a large measure, of the "doubtful" reactions.*

In regard to the interpretation of results, I have tabulated all, without qualification as to degree, as positive or negative. By a positive result I mean a marked absence of hæmolysis shown by absolute cloudiness on withdrawing from the incubator and a well marked sediment of blood corpuscles macroscopically, if the tubes remain standing at a cold temperature over night. Slight fixation of the complement has been regarded as negative. This naturally lowers the percentage of positive results, but so far as I am aware, I have not reported a positive result in any non-syphilitic case.

Of the 182 cases examined, there were 49 showing no syphilis in the history or physical examination. These included typhoid, tubercular arthritis, tubercular meningitis, leukemia, pernicious anemia, delirium tremens, chancroid, furunculosis, senile dementia, epilepsy, septicemia, gas poisoning, carcinoma, cerebral hemorrhage, gastric ulcer, scarlet fever, acute pharyngitis and other disease, as well as normal blood from a healthy individual. In regard to scarlet fever, about which there has been considerable discussion, following the positive reaction by Muck and Elienberg† in 40% of scarlet fever patients, I examined 9 cases. Some of these showed a very slight positive reaction; but, according to my methods of classification, all are tabulated as negative. All the rest of the above list of non-syphilitics were also negative.

There were 31 cases in which the diagnosis, clinically, was doubtful, and which were not later cleared up by the

* Kraus and Levaditi, Handbuch der Immunitätsforchungen, Bd. II, p. 1110.

† Berlin. klin. Woch. 1908, No. 20.

course of the disease or by autopsy. Some of them showed a positive reaction, but mostly negative. No conclusions can, however, be taken from these cases.

Of syphilitic cases, including tabes and latent cases, 101 individuals' blood was examined. Among these there were 13 primary lesions, 6 reacting positive and 7 negative, making 46% of the cases positive. Other authors' percentages vary from 100% (Butler) to 38.6% (Hoehne). This great variation seems to be due to the duration of the primary lesion at the time the blood was taken. Of my 6 positive cases all were of three weeks duration or over, and of the seven negative all were of three weeks duration or less. This accords with the generally accepted view that the reaction appears generally at about two or three weeks after the first appearance of the chancre. It is interesting to note that, in primary lesions, the spirochæta pallida was not found in several cases where the Wassermann reaction was positive in a series published by Hoehne.* Exceptionally the reaction may appear very early, even before the appearance of the primary lesion;† I have found no such cases, however.

Of the secondary cases there were 26 tested,—20 positive and 6 negative,—or 77% positive. Of the six negative, all but one had received more or less recent treatment varying from five weeks to one year, and in all these the rash was already fading or entirely gone, the active disease being represented by a few mucous patches. The other case was an early one, being only six weeks after the first appearance of the chancre.

Of the tertiary cases there were thirty-two,—positive 30, negative 2, or 94% positive. Both the two negative cases had received considerable treatment just prior to the time the blood was taken for examination. Among the positive cases two deserve especial mention. In one the diagnosis of carcinoma was definitely made on account of the large, nodular tumor of the liver, marked cachexia and loss of weight, typical secondary anæmia, etc. As the serum reaction was markedly positive, mixed treatment was begun and was followed by almost complete disappearance of the

* Berlin. klin. Woch. 1909, No. 19, p. 869.
† Lesser. Deutsch, med. Wochen, 1909, No. 9, p. 379.

tumor, and the patient, when last seen, was apparently in perfect health, good flesh, and free from pain.

The other case, for which I am indebted to Dr. J. W. Dewis, was operated upon in one of the hospitals in this city for a large abdominal tumor. A large, inoperable, retroperitoneal tumor mass was found and the probable diagnosis of sarcoma made. The serum test was tried and found markedly positive and following this, the tumor, under mixed treatment, has entirely disappeared. I might mention here another case in which the reaction was not tried, and in which the diagnosis of malignant disease of the testicle was made. Castration was done and the pathological diagnosis of gumma was established. It is in the light of such cases as these three that I would urge the more frequent resort to this test in supposed malignant disease, even though the diagnosis may seem quite certain, as I have found only six cases, reported by Weil,* and by Solomon,† of non-syphilitic tumors reported as giving a positive reaction when there was no sign or history of syphilis, and the technique of these investigators has been questioned of late. On the other hand a progressing tertiary syphilitic lesion will, with quite a fair degree of certainty, give a positive result as shown by most all authors as well as by my own meagre figures.

Of "latent" cases, meaning by latent those cases giving a good syphilitic history but at the time of examination showing no active signs or symptoms of the disease, I have examined 18 cases,—9 positive and 9 negative,— or 50% positive. These may be divided into early latent, or those of syphilis of less that three years duration, and late latent, or those of three years or more duration. Of the early ones there were eight cases, 25% positive, and of the late cases 10, 70% positive. The low percentage in the earlier ones, most of which had just received or were still taking treatment, supports the view of Purckhauer,‡ Fischer,§ Citron,‖ and others that treatment often, in the earlier stages of the disease, is much more effective in making a

* Wien. klin. Woch. 1908, No. 26.

† Wien. klin. Woch., 1908, No. 18

‡ Münchener med. Woch., 1909, No. 14, p. 699.

§ Medizinische Klinik, 1909, No. 5.

‖ Kraus and Levaditi, Handbuch der Tech. d. Immunitätsforschungen, p. 1111.

positive reaction become negative than later in the disease.

Of congenital cases I have examined only two cases, both of which showed a very marked positive reaction, as has been found by almost all observers, whether the cases have received treatment or not.

Of tabetics, I examined only eight cases,— 3 positive and 5 negative, or 38% positive. They were nearly all advanced cases. This is lower than the percentages usually reported, but Lesser* has shown that the percentage is much higher in early than late cases, due possibly to the very chronic course of locomotor ataxia, which makes the late stages of it much further removed from the original syphilitic infection than is the case in dementia paralytica where the late stages show a very high percentage of positive results.† I have not had the opportunity of testing the blood of any sure case of dementia paralytica.

In regard to the effect of treatment, I have not had the opportunity of following any cases through their treatment by repeated tests, but the negative cases in the secondary stage, and in the early latent cases, seem to show a marked effect of treatment on the reaction in the earlier stages of the disease. But as an exception to this I may mention one case which showed a marked positive reaction just after a prolonged, energetic course of treatment, which had caused all manifestations of the disease to disappear. In such cases as this the reaction sometimes becomes negative after a month or two without further treatment, as shown by Blaschko,‡ Blumenthal and Roscher,§ and others. In the late cases of syphilis, treatment seemed to have less effect, for several of my positive reactions were obtained in cases that just previously had been having a rather extended course of treatment. In one case there had been several recurrences of the disease which had all been well treated for a fair length of time; and now, with the appearance on the scrotum of a limited syphilitic rash, forty years after the primary infection, the reaction is strongly positive.

This leads me to say that, with fresh outbreaks of the disease in any form, the reaction is most always positive, whether negative previously or not.

* Deutsch med. Woch., 1909, No. 9, p. 379.
† Annuales Medicales Psych., 1908, July and August.
‡ Deutsch. med. Woch., 1909, No. 9, p. 383.
§ Medizin. Klinik, 1909, No. 7.

Finally, as regards the significance of a positive reaction: most investigators admit that a positive reaction in a latent case probably does not necessarily mean that an active syphilitic lesion is going on at the time, for these occur too frequently to be explained in this manner as Fischer* has shown. But observations of others† seem to prove that a positive reaction means a present active syphilis going on at the time. The fact that some of the latent cases still showed a positive reaction after prolonged antisyphilitic treatment would seem to mean that the reaction is not affected by treatment for some reasons which prevail in cases of intractable syphilis where specific treatment avails little or nothing. It seems, therefore, that a positive reaction is a direct indication for treatment, to be persisted in until the reaction becomes negative. Citron suggests that in this way only, combined with a careful surveillance of the case for visible signs and symptoms, can the more severe later lesions, often starting so insidiously, be warded off and the cases of intractable syphilis be, for practical purposes, cured.

In regard to a negative reaction, although there are a few exceptions, it seems as if this occurring directly after the earlier symptoms have subsided, if repeated at long intervals and still found negative, is another point of prognostic value as regards the questions of marriage, life insurance, heredity, or, in other words, of complete cure.

In conclusion, I wish to extend my thanks to Dr. Mallory for the use of the City Hospital Laboratory, and to the Boston Board of Health Laboratory, for their continued courtesy and for the use of certain pieces of apparatus without which my work would have been impossible. I also wish to thank Drs. Post and Smith of the Boston Dispensary, and, collectively, the Staff of the Boston City Hospital, and numerous physicians, for their kind coöperation in permitting me to utilize the material in their clinics and private practice.

* Medizin Klinik, 1909, No. 5.

† Sesser. Deutsch. med. Woch., 1909, No. 9, p. 379. Blaschko, Deutsch. med. Woch. 1909, No. 9, p. 383. Citron. Kraus and Levaditi, Handbuch d. Tech. & Methodik d. Immunitätsforschungen, p. 1111.

ARTICLE XXVIII.

THE INTRAVENOUS USE OF STROPHANTHIN IN BROKEN CARDIAC COMPENSATION.

By ARTHUR K. STONE, M.D.
OF BOSTON.

READ JUNE 15, 1909.

THE INTRAVENOUS USE OF STROPHANTHIN IN BROKEN CARDIAC COMPENSATION.

All persons engaged in the active practice of medicine have felt the need of a quick acting cardiac stimulant, one that shall bring up the flagging action of the heart for a time until the patient shall have a chance by elimination or other means to get rid of the toxin which is destroying his vitality, or removing the load which is being put on the overworked heart. While in certain instances alcohol may help in favoring metabolism, the majority of the physiologists and pharmacologists tell us that it is a very broken reed on which to rely in cardiac stimulation. Tracings shown by Crile in this building, and the work of others, have shown that strychnia has but little or no influence on the blood pressure in collapse. Digitalis, in its various forms, acts but slowly; often hours must elapse before we get a response after its administration, and in this time the patient may die. In the majority of cardiac conditions, relief is best obtained from morphia, which reduces the pain and distress to such an extent that the patient becomes quiet and husbands his strength until the time shall arrive when the digitalis is able to take effect.

There are times when the distress of the patient with broken compensation is so great that it is most pitiful to see. Their is an air of hunger, restlessness and a sense of impending danger. Usually there is great discrepancy between the frequency of the pulse, as it is felt at the wrist, and the number of contractions of the heart, as shown by the stethoscope or by the recording cardiogram. The whole organism is at such a state of low vitality that absorption of drugs administered by the mouth is greatly prolonged,

and even results from subcutaneous injection are by no means as prompt as under more normal conditions.

The need of a drug which shall act quickly and effectively, under such conditions, has long been appreciated. Hence it was that the report of A. Fränkel, in 1903, was received with much enthusiasm. This paper, presented at the Congress for Internal Medicine, describes the action of strophanthin introduced intravenously into patients suffering with broken compensation. In substance Fränkel said that with strophanthin the amplitude of the pulse was increased in three or four minutes, and at the end of five to ten minutes the pulse rate was decidedly slowed, and that in most cases diuresis promptly set in. He did not recommend the use of strophanthin as a general routine, but only when the heart failure was in a threatening degree—it was to be used as a life saver, and in the treatment only of chronic cases where it was impossible to use the stomach. Incidentally it cost less, and the dose was many times smaller than the digalen, which had been used intravenously by himself and others.

Dr. Boos, who was working in the laboratories of Strassburg when Fränkel determined to try his experiment on the intravenous use of strophanthin, prepared the first solutions which he used. Shortly after his return, Dr. Boos called my attention to Fränkel's experience, and told how specially successful it was in relieving the distressing symptoms which so often arise in the course of failing compensation. I did not have any opportunity to give the drug a trial until the summer of 1908. My experience then verified Fränkel's statements, and made me feel that in strophanthin, given intravenously, we have a new ally, which in a number of cases will aid us in our efforts to alleviate pain and distress, and in some few instances enable us to save life;* and all this in a way that has heretofore been impossible.

* My experience in this regard, which has been quite remarkable, will be found in a paper read before the American Climatological Association, and published in the *Boston Medical and Surgical Journal* for Aug. 19, 1909.

Strophanthin is a glucocid derived from the seeds of the strophanthus plant, and is a stable definite substance. When first introduced it did not gain favor, because, though it acted well when administered by the mouth, it was found to be irritating to the stomach, and in a short time set up gastric disturbances which seemed greater than the digitalis compounds. For the most part digitalis has been considered the drug to be used in the management of cardiac conditions. The crystalline strophanthin is considered by Hatcher to be a "perfectly definite uniform substance," and of very nearly uniform activity. It is certainly a very stable substance, as we proved at the Massachusetts General Hospital the past summer, when the standard glass ampules of Bœhringer manufacture were used up, and more strophanthin was needed. Some of Merck's strophanthin which had been in the hospital for eight or ten years—and possibly longer—was used, and found to be exactly as potent clinically as the more freshly made preparation. I have recently seen a physician who felt that Merck's preparation was not as carefully standardized as was the Bœhringer.

The strophanthin is an amorphous or crystalline powder soluble in alcohol, and what is more important, in water. The strophanthin recommended by Fränkel is put up by Bœhringer in glass ampules, each containing one milligram of strophanthin to one cubic centimeter of sterilized water. This makes a perfectly clear watery solution.

This preparation is so standardized that each milligram has the potency of twenty frog units; that is to say, that the milligram of strophanthin properly applied has the power to stop the hearts and produce deaths of twenty frogs, of similar size, and under similar conditions of temperature, time of year, and all other precautions that have to be observed in dealing with such a variable unit as a living animal.*

* There seems to be a doubt as to the exact strength of various makes of strophanthin. In the *Journal of the American Medical Association* for

A dose for an adult who has not been taking any other form of digitalis or strophanthus medication, and especially in all those cases where sudden collapse has occurred, should be one milligram. This will give immediate and powerful results, and will not have to be repeated for eighteen to twenty-four hours at the earliest, and there is practically no danger of heart block. Should, however, there be any question of previous digitalis medication it is better to use a smaller dose and be on the safe side, even though the intravenous injection has to be repeated. And it will be found that many, even very sick patients, and especially women, object to this operation, while others will beg for a repetition of the dose.

In some favorable cases a single injection will suffice to restore tone to the heart and stimulate diuresis. In other cases the strophanthin will have to be resorted to time and again to help carry the patient along his downward course with the maximum of comfort. Here the physician will learn the size of the dose of strophanthin that is required to relieve the distress of the patient and to make the struggling ventricle work effectively enough to carry its load for the time being.

The immediate result of the intravenous administration of strophanthin is to increase the amplitude of the pulse wave. The frequency of the heart is at the same time slowed within a few minutes, almost, if not quite, as completely as can be accomplished by the administration of digitalis preparations by the mouth in the course of several days. Therefore, when it is desirable to get speedy relief in broken compensation where the heart is rapid and the blood pressure lower than is needed to retain the balance of

May 9, 1909, p. 1499, it is stated that the crystallized strophanthin is twice as strong as the "official," though identical in its action. Hence I should strongly advise anyone to use Bœhringer's standardized preparation, and if any other is offered, be sure that it is standardized in like manner with this. Any deviation from this rule will lead to disaster.

the fluids in the body, when the apex and wrist are far apart, when there is great distress and restlessness with a sense of impending disaster, strophanthin intravenously will give in most instances immediate relief, which will last from twelve to seventy-two hours, and in some cases even longer, and this relief will be accompanied by free diuresis, or will permit diuretics previously inert to become once more active.

There are dangers in the intravenous use of strophanthin which must not be underestimated. The therapeutic dose and the poisonous dose are near together, and as the elimination of the drug is slow, one can easily get toxic symptoms of slowed pulse and of heart block from too frequent administration. The previous administration of digitalis is an almost sure contraindication to the use of strophanthin. Cases where the renal conditions are prominent do not respond as favorably to the use of strophanthin, and it is in these cases, especially where digitalis had been previously used to some extent, that the majority of the deaths that have been attributed to strophanthin have occurred. Of the eight reported deaths which have been ascribed to strophanthin it is certainly doubtful whether all of them were really due to the drug. Indeed the experience of one man is worthy of note. A cardiac patient was having his arm sterilized preparatory to the intravenous administration of strophanthin when he fell forward and died. Had death taken place a few moments later, it would have been added to the deaths caused by strophanthin. Nevertheless the user must bear in mind what Mendel—who is not favorable to strophanthin—has said (though to my mind it is one of the best endorsements of strophanthin): "The medicament is brought with a blow directly upon the weakened heart, which is pushed immediately to its highest work requirement."

Besides care in the selection of the case and a knowledge of the previous medication, the administrator must be skilful in the administration, taking care not to let the fluid

solution escape into the tissues or into the wall of the vein. In the one instance marked painful irritation with swelling and redness will appear about the strophanthin solution, and in the latter case thrombosis may occur so as to give considerable anxiety and certainly great discomfort. (The digitalis preparations that are used intravenously have the same irritant properties.) Repetition of a milligram dose should not be made under twenty-four (24) hours except in exceptional cases, and the condition of the pulse should be carefully noted before any such repetition is made. A high blood pressure is not necessarily a contraindication, but marked brachycardia always is.

The excretion of strophanthin, according to Hatcher, is probably much greater by the intestine than through the kidneys. In his experiment on rats, where the drug was used subcutaneously, only a very little strophanthin could be found in the urine, while the amount in the intestine was much greater. When it was administered in the food practically none was eliminated by way of the kidneys. This in a way explains why the strophanthin tends to accumulate in the system, as elimination by the intestinal tract is much slower than through the kidneys.

I shall only attempt to report briefly three cases as illustrative of broken cardiac compensation that is relieved by the use of strophanthin.

The first case was that of a woman 43 years of age, who was supposed three years previously to have had manifestations of cerebral syphilis, although at the autopsy there were no gross evidences of syphilis found anywhere upon the body. For a year or more she had had "indigestion," manifesting itself by dyspnœa on exercise after meals. This of late had increased rapidly, so that all exercise produced dyspnœa. She entered the Massachusetts General Hospital on account of this great shortness of breath on exertion. For sometime before entrance she had been obliged to sit up in bed on account of a distressing, choking feeling. The blood pressure varied from two hundred and fifty m.m. to one

hundred and eighty m.m. of mercury. An X-ray plate showed no dilated arch of the aorta. Examination of the eyes showed no changes in the fundus. The urine was without albumen, and of a specific gravity of 1,011. The heart was not enlarged, and a systolic murmur at the apex was heard and also a diastolic murmur at the base of the heart. The liver and spleen were both distinctly hardened and enlarged. The superficial arteries were not specially palpable. After some stay at the hospital, she was transferred to the House of the Good Samaritan. She had been somewhat relieved, but the dyspnœa returned on the slightest exertion. There was insomnia, great restlessness and distress which nothing seemed to relieve, although digitalin (Merck's) seemed to give the most relief. She became much worse and delirious. Œdema of the extremities and albuminuria (over ¼%) appeared. Apparently she was about to die. At this time I used strophanthin for the first time and repeated it two days later. To my great surprise she improved rapidly, the delirium disappeared as did also the œdema. She was about the wards and fairly comfortable. This continued for three weeks, when she again received a dose of the strophanthin, as the restlessness and distress were returning. The injection was not well administered and she had much discomfort resulting, with redness, tenderness and swelling at the place of administration, and considerable œdema of the arm. There was later, evident phlebitis. In spite of this she called in a few days again for strophanthin, and from then on, from time to time, as the terrible restlessness and distress appeared she would ask for the strophanthin, which gave her immediate relief and kept her comfortable for two or three days or even longer. In all she had twenty (20) injections between May 26th and her death on Oct. 15th. In almost all of the injections was there some local inflammatory reaction from the drug. The immediate cause of death was pneumothorax from a softened area in the lung. No emboli or thrombi were to be demonstrated. The aorta had areas of thickening, especially in its lower third, also about the left coronary artery. The right renal vein was much thickened and the right kidney was markedly smaller than the left. The heart was hypertrophied and dilated and the myocardium had a yellow tinge. The large liver and spleen appeared to be due only to chronic passive congestion.

The next case to be reported is that of a man aged 52 years. He weighed 245 pounds at his best condition. He had never previously been sick. In January 1908 he began to have "indigestion," that is, distress if he exercised after eating. This he first noticed after an attack of the "grippe." By March the dyspnœa had increased greatly and he slept poorly. Œdema began to develop in the extremities. He entered the Massachusetts General Hospital in May 1908. His heart was not enlarged nor were there any signs of valvular disease or irregularity of the rhythm. There was no fluid in the belly. Under digitalis marked diuresis set in in four days and his weight fell rapidly from 233 to 211 pounds, and later to 206 pounds; compensation had just begun to fail and he responded quickly and well to treatment.

Two months later he re-entered the hospital for persistent dyspnœa on any exertion, no matter how slight, and for insomnia which had increased so that for two nights before entrance he had been obliged to sit in a chair all night. The heart this time was dilated and enlarged to the right of the sternum. There was fluid in the belly and the liver was enlarged and tender. There were no heart murmurs and no irregularity of the heart. The blood pressure was 176 m.m. of mercury. There was now a slight trace of albumen and the specific gravity was 1;010. He was given, shortly after entrance, 1 m.g. of strophanthin. The blood pressure rose at once to 205 m.m. of mercury in a few minutes, then fell to 200 and remained there. During the night he passed 170 ounces of urine and in the next 24 hours over 200 ounces of urine were voided. Two days later he was up and comfortable. The œdema and ascites had disappeared, and also the tenderness from the liver. The dyspnœa would return on slight exertion, however. When he left the hospital he rested for a time, then moved his household effects and over-exerted himself, and the broken compensation came on rapidly, and he re-entered in a little worse condition than at the previous time. Having been on digitalis medication, he was put to bed and given theobromine, which in a few days produced marked diuresis up to 200 ounces, and soon he was able to leave the hospital. In only three weeks after his discharge he was back, again a little worse than before. Rest in bed, morphia and

theobromine again caused a diuresis of 110 ounces, and soon after he left the hospital against advice.

The case is interesting as showing the ready response of the patient to all treatment, and the almost instantaneous relief given by the intravenous strophanthin injection as compared with the four days required by the digitalis treatment on the first entry, when the symptoms were less marked than at the second entrance.

The cases reported show a type of arteriosclerosis, so-called, accompanied with great dyspnœa and with few renal symptoms. The next case presented the history of valvular disease of the heart. This man first entered the Massachusetts General Hospital in 1892 for acute articular rheumatism. Again in 1898 he was admitted for rheumatism and double mitral disease. In 1906 he entered again for mitral disease. Since his discharge in 1906 he was well until one week before entrance when he was suddenly taken with pain in the left shoulder when going to work. There was no palpitation, but a sense of depression under the sternum. On entrance there was orthopnœa. The heart was moderately enlarged, and signs of double mitral disease were present. The pulse was rapid and irregular. There were râles in the bases of both lungs. The liver was enlarged to the umbilicus, and was firm, resistant and rather tender. He was given strophanthin and the blood pressure rose from 110 to 125 in a few minutes, and he improved rapidly, so that after two days the belly was flat and the liver smaller and not so tender. He did well as long as he remained quiet. He went home and soon began to have smothering attacks with great distress. He went for a time to another hospital and then returned to the Massachusetts General Hospital. His face was anxious and he appeared to be suffering greatly. The heart was much dilated, very irregular as to rate, force and rhythm. He was at once given a quarter of a milligram of strophanthin and the blood pressure changed from 110 to 125, and he experienced great relief.

This was on October 8th, and between then and Dec. 29th, 1908, he received 45 intravenous injections; from then on till his death on Jan. 6th, 1909, he was kept under the influence of large doses of morphia.

His attacks of distress would come on suddenly at times and be most harrowing. The pulse waves appearing at the wrist and the contractions of the heart at the apex showed very far apart upon the chest. The injection of a quarter to a half a milligram of strophanthin would give most surprising relief. I have seen the pulse come up in volume and the patient fall quietly to sleep during the time it took the house officer to clean up his syringe and return to the bedside after giving the injection. Nothing else that was tried while I was on duty gave anything like the relief as did the strophanthin. Sometimes the dose had to be repeated each day; at other times there were respites of several days of comparative comfort.

On two occasions attempts were made to give the strophanthin by injecting it into the muscle, but in each instance after having no alleviation of the symptoms an intravenous injection had to be resorted to in order to secure the desired relief.

At the autopsy an adherent pericardium was found in addition to the deformed mitral valve, and dilated heart. At no time was there any sign of strophanthin poisoning from any of the forty-five injections. The dose was either a quarter or half a milligram of Merck's strophanthin.

These cases will, I think, suffice to show that in strophanthin we have a powerful agent for good if used with discretion, and I am sure, one with which disastrous consequences may occur if it is used recklessly.

DISCUSSION.

Dr. W. F. Boos, of Boston: In the summer of 1907 I introduced the intravenous application of strophanthin at the Massachusetts General Hospital. I had closely followed the work of A. Fränkel and I felt convinced that this body was the one active principle of the digitalis group which could safely be injected directly into the blood.

In 1903 Fränkel* carried out a series of experimental

* Arch. f. Exp. Path. u. Pharmakol. 51, (1903) p. 84.

studies on the pharmacological action of digitoxin, digitalin (digitalinum verum) and strophanthin, the three pure active drugs of the digitalis group. His aim was to find a pure drug which with easy solubility would combine prompt action and a minimum of cumulation. He gave the drugs subcutaneously, his experimental animals being cats.

It was never possible for Fränkel to produce a decided therapeutic effect (slowing of the pulse) in his animals with a single dose of digitoxin, without at the same time producing symptoms of poisoning. If, however, he gave daily small doses, one of which was neither toxic nor therapeutically active, he succeeded after a few days in producing a lowering of the pulse rate by cumulation. Once established, this effect could be maintained for months and months without apparent injury to the animals; they ate well, slept well, and seemed perfectly happy in spite of their slow pulse.

He produced the desired effect by giving the animals every twenty-four hours .02 mg. digitoxin per kilo body weight; the change in the pulse rate appearing on the fifth day. If, however, the injection was made fourteen hours instead of twenty-four hours after the previous one, the animals invariably vomited, this being the initial sign of intoxication. A slight increase in the dose from .02 mg. to .03 mg. per kilo body weight was sufficient to cause slowing of the pulse after the second injection, and vomiting after the third. These results show how very near together the toxic and the therapeutic doses of digitoxin are. They also show that digitoxin always retains its action; the system does not become "accustomed" to the drug as in the case of morphia.

Digitalin was found by Fränkel to be similar to digitoxin in its behavior, except that there was a greater latitude between the toxic and the therapeutic doses of the drug. This was also true of strophanthin.

All three drugs showed a decided cumulative action, which proved to be quite independent of their solubility. *The degree of cumulative action is dependent on the stability of the union between the active drug and the poison-sensitive elements of the mammalian heart.* The solubility of the drug determines the rapidity of its action, the more soluble the quicker the action.

When the three drugs are given in equivalent toxic doses subcutaneously the action appeared

from strophanthin in 4 to 5 hours,
from digitalin in 48 hours,
from digitoxin in 60 hours.

Digitoxin has by far the most pronounced cumulative action. It was sixty hours before the pulse showed the effect of the drug, but when the action had appeared it continued for seven days, the pulse becoming slower and slower until the animal died.

Koppe* furnished on himself a most striking illustration of the cumulative action of digitoxin. He took .5 mg. of pure digitoxin. The next day he took 1 mg. When no action appeared after four days he took 2 mg. at 10 A. M. on the fifth day. At 11 A. M. he felt exhausted and his pulse dropped from 78 beats to 58. At 3.30 P. M. he vomited. The vomiting was frequently repeated during the afternoon. Meanwhile the pulse fell to 40 and intermitted after every two beats. He could not stand, his vision became clouded and light objects in the room looked yellow. He vomited four times during the next night. After this he recovered slowly but it was five days before he could walk unaided.

Strophanthin, because of its quick action and slight cumulation, makes exact dosage possible. Strophanthin, moreover, is the one active principle of the digitalis group which approximates most closely in its action to the effect produced by the combined digitalis bodies as they occur in extracts from the digitalis leaves.

Gottlieb and Magnus,† Kobert‡ and others claim for the bodies of the digitalis group a powerful action on the vessel wall. Digitalin is said to act more particularly on the vessels of the splanchnic area, producing a contraction, which in turn leads to a reflex dilation of the peripheral blood vessels. Digitoxin is said to produce a general vascular contraction. If this is true, digitoxin is decidedly contra-indicated in degeneration of the heart muscle, in atrophy or dilatation, in atheroma of the vessel wall.

* Arch. f. Exp. Path u. Pharm. 3, (1874) p. 274.
† Arch. f. Exp. Path. u. Pharmacol. 47, (1901) p. 185.
‡ Arch. f. Exp. Path. u. Pharmacol. 22, (1886).

Strophanthin has practically no action on the vessel wall.

Although digitoxin is quite insoluble in water, a proprietary preparation purporting to contain digitoxin in solution was introduced some years ago by Cloetta under the name "Digalen" or "Digitoxinum Solubile." In this preparation the digitoxin is held in solution by a mixture of alcohol, glycerine and water; the name of "soluble digitoxin" is therefore a misrepresentation of fact. Digalen is open to all the objections which apply to any form of digitoxin; its insolubility and great cumulative action make it unfit for intravenous use. Dr. A. K. Stone reports in his paper the remarkable case of Sherwood, who received 45 intravenous injections of strophanthin; such therapy would be utterly impossible with digalen or any other preparation of digitoxin.

Digitalin acts too slowly, strophanthin is therefore the choice. Strophanthin is of course not ideal in its action and cannot replace the true digitalis effect produced by extracts of the digitalis leaves; but when immediate results are necessary to tide over conditions of collapse, or when, as is frequently the case, digitalis by mouth does not produce its effect, strophanthin given intravenously will usually give the desired impetus toward re-establishment of compensation, so that medication by mouth may be continued successfully.

At the Congress for Internal Medicine held last April in Wiesbaden, Fleischer reported on the intravenous use of strophanthin. He considers it a sovereign drug in cases of broken compensation due to valvular disease. Personally I have found the drug very efficient also in cases of myocarditis, where one would perhaps expect but little result.

I report three cases of this class, which I think will serve to illustrate the many-sidedness of strophanthin action.

Case I. In the fall of 1907 I saw Mr. S., 82, retired merchant, in consultation with Dr. C. R. Draper, of Medford. The patient was in the last stages of myocarditis. Profound dyspnœa, a very irregular, rapid and weak pulse, general œdema, particularly marked in the legs and scrotum, and great mental distress, were the most prominent features of the case. There were no heart murmurs present.

One milligramme of strophanthin was injected into the median cephalic vein. The dyspnœa was relieved almost immediately, and the pulse, slowing from 128 to 84 beats in the minute, became regular and of good quality. During the day increased diuresis set in and the bloating about the legs and scrotum diminished greatly.

Three injections were given in the following four days and improvement was noticed following each injection. During these days, while strophanthin was being given, the patient was able to move about the room, a thing he had not been able to do for weeks before. He slept well after weeks of insomnia and his mental condition was much happier. The patient died suddenly while going to the bathroom about six hours after the fourth injection.

Case II. On Feb. 5, 1909, I saw Mr. P. P., 52, banker, in consultation with Dr. H. F. R. Watts, of Dorchester. The patient had been suffering from increasing dyspnœa, and disturbed sleep associated with dyspnœa, for over a year. Today at 8 P.M. there was a sudden collapse with pulmonary edema. I saw the patient at 10 P.M.; meanwhile Dr. Watts had given him adrenalin and digitalin subcutaneously and whiskey by mouth, and his condition was better. The patient was still very pale and somewhat cyanotic. He had considerable dyspnœa. The heart was appreciably enlarged, there was gallop rhythm, no murmurs to be heard. Throughout both lungs medium and fine moist râles were heard. On account of the recent injection of digitalin I decided to wait before giving strophanthin intravenously. The patient slept very little and had much dyspnœa all night.

Feb. 6. Considerable dyspnœa, some cyanosis. Pulse 104, irregular, of poor quality.

Strophanthin, 1 mg., given intravenously. The result was striking; within five minutes the dyspnœa was entirely gone. The cyanosis disappeared rapidly, the pulse dropped to 84, was regular and of excellent quality. The following night the patient slept from 8 to 10 hours without a break, a thing he had not done for years before. The dyspnœa did not return for months.

Case III. On March 10, 1909, I saw Mrs. K., 72, in consultation with Dr. T. C. Erb, of Boston. The patient had

considerable dyspnœa, the pulse was very irregular, intermittent and of poor quality. The heart was not enlarged, the sounds were weak, there were no murmurs. Edema was absent. The patient was in very depressed spirits, she vomited practically all food and suffered from a persistent diarrhœa. Her nights were almost sleepless.

One milligramme of strophanthin was given intravenously. The pulse fell during and immediately after the injection to 42 beats per minute. Then it rose gradually to 65. It remained at 65 for over a week, was not intermittent but regular and of good quality. The dyspnœa disappeared soon after the injection. The gastro-enteric symptoms quieted down and the patient slept well.

Two more injections have since been necessary. The sleep-producing effect of the injections was particularly gratifying. Before the intravenous application of strophanthin it was impossible to give the patient digitalis preparations by mouth on account of extreme gastric irritability. The latter having disappeared under careful diet and strophanthin, it is now possible to give the patient infusion of digitalis by mouth with excellent result.

Strophanthin given intravenously is frequently a godsend to patients in the later stages of phthisis. A man who had been carried about for weeks walked upstairs without dyspnœa shortly after the injection. Strophanthin intravenously is particularly valuable to sustain patients during the crisis of pneumonia.

The drug should be injected only by physicians who have had much experience with cardiac disease and who are sure of their intravenous technique. I have given strophanthin intravenously over fifty times without a single death attributable to the drug. I make it a rule to wait long enough with the injection to be sure that all digitalis previously given has been excreted.

ARTICLE XXIX.

LABORATORY WORK BY THE COUNTRY PHYSICIAN.

By M. A. CUMMINGS, M.D.
OF WINCHESTER.

READ JUNE 15, 1909.

LABORATORY WORK BY THE COUNTRY PHYSICIAN.

This paper was suggested by a consultant who spoke of the laboratory work we were doing in Winchester as unusual in his experience.

The advantage of many of these laboratory examinations has been proven, and it is to these I wish to direct the attention of those who, like myself, have to pick up the methods in the course of an active practice.

Thorough observation and careful weighing of symptoms and signs are necessary for a proper recognition of a condition that presents itself in a person consulting a physician. The color of the skin, the attitude, the expression, the history, family and personal, the account of pain or insomnia, and all of the data that we usually take note of in our patients, are of the first importance.

A careful physical examination should of course be insisted on. Neglect of this may bring humiliation or disaster. A woman had pain in her shoulder for a week following a fall, thought to be due to a sprain. After the reduction of a partial dislocation there was immediate relief. Another woman was treated for two weeks for ovarian inflammation. Examination, not previously made, showed a mass the size of two fists, which proved to be pelvic abscesses.

In addition to the ordinary examination of a patient by inspection, palpation, aucultation and percussion, we may be able to confirm or establish a diagnosis by means of a critical examination of the tissues or fluids of the body—or its secretions and excretions—chemically or microscopically.

In infections the offending germ may often be grown on culture media and its identity more easily determined.

The graduating class of twenty-two years ago had instruction in the use of the microscope, bnt so far as personal recollection goes, few of them knew more about its use than was necessary to recognize urinary sediments, and, to a slight extent, the character of new growths.

The examination of sputum was tedious, as was the examination of the blood for plasmodium malariæ. Very little had been done at that time in bacteriology or examination of the blood.

Having been brought into professional contact with recent graduates and consultants, and through them become acquainted with some of the methods and the value of these examinations, it has seemed worth while to remind the older practitioner not in touch with the city laboratory how much assistance he may have at a slight outlay of time, money or effort, and how much satisfaction he may derive from a personal solution of perplexing cases.

The State has provided for the examination of sputum in tuberculosis, of the deposits in suspected diphtheria, and of the blood in suspected malaria or typhoid, and we often avail ourselves of this privilege. But the physician away from the City or State Laboratory can often make his own diagnosis in a short time, after a little practice, and repeat his examinations at his pleasure.

Every practitioner should own or have access to a microscope with oil immersion lens, and as he uses this from time to time he will find his facility increasing, and with that facility a greater satisfaction in his ability to do better work.

If the question of the presence of the tubercle bacillus arises, having the carbol fuchsin and acid blue stains, in a very few minutes one can determine the presence or absence of these bacilli in the specimen.

It is not perhaps necessary to examine sputum from every case of cough, but it can do no harm at least, and may save future self-questioning and humiliation.

Some three years ago two children, five and three years of age, had a pretty severe attack of pertussis. It seemed best that they should be taken to the seashore for the summer. While there the nursemaid, while making a hurried visit to her home in a neighboring town, came in to my office having a temperature, cough, rapid pulse and râles. Treatment for bronchitis was given, and direction to report if not better in two or three days. I heard nothing more from the maid, but some three months later both children, having recovered from the pertussis, died of tubercular meningitis. Later inquiry showed that the maid was sick all that fall with a cough and that some members of her family were tuberculous. Of course there is no way of proving that the children were infected from the nurse, but I cannot help wondering if an early discovery of her condition might not have prevented their death by tuberculosis.

Occasionally the physician sees a patient having a moderate temperature, pulse elevated over 100, with nausea and vomiting and complaining of sore throat. Examination shows some swelling and a deposit on the tonsils, velum and pharynx, that is not easily removed. Only a bacteriological examination can determine whether the condition is diphtheria. If it is, the sooner antitoxin is given the better, and most of us would give it on a chance. A severe urticaria lasting for some months, and an attack of eczema following its use in my personal experience, also the report of unfavorable symptoms occurring in some cases after its use in patients with asthmatic tendencies, has led to its use in my own practice only in those cases where the necessity was evident.

By keeping on hand a few culture tubes which may be obtained at small expense from some of the medical supply

houses, also sterile swabs, one can take a culture from such a suspected throat, and after keeping it in a warm place for 12 to 18 hours, there will be sufficient growth to make a smear on a slide. This may be stained with Loeffler's blue, and on examination through the oil immersion lens will show the presence or absence of bacilli. If only the cocci are found in the culture the case does not demand antitoxin. Recently a woman 46 years old had what appeared to be a false membrane over tonsils, velum and posterior pharyngeal wall. The next morning the tube showed only staphylococci and streptococci in quantity, but no bacilli. Following the use of an alkaline salt solution and argyrol the throat cleared quickly.

After a physician has had a case of nasal diphtheria that has shown no throat signs and no other symptoms than of an ordinary cold in the head, except progressing pallor and weakness, it is a comfort to be able to determine what the infection is. Last summer an infant six months old had in addition to the signs of a cold in the head a yellowish excoriating discharge from the nostrils. Culture showed this to be due to an almost pure growth of staphylococcus pyogenes aureus. Within ten days four other members of the same household had various forms of pharyngitis and one developed a periarthritic rheumatism, that lasted six weeks.

In the matter of examination of the blood, one does not need to be specially expert to determine roughly the hemoglobin by the Tallquist scale, or the contour and relative size of the red corpuscles and presence of white corpuscles in unusual number, by means of the Leishman-Wright stain, all of which may be done in ten minutes.

The same stain will bring out the plasmodium malariæ if present.

The determination of the character of tissue changes and of the chemical and bacterial content of fluids, as well as the preparation of sera and vaccines, must be left to the expert.

I have not spoken especially of urinary examination because all of us are qualified to do this to the degree necessary for ordinary conditions.

Colon infection of the bladder or kidneys as shown by fever and pain, with perhaps ulceration of bladder wall and cloudy urine, with or without pus, should be referred to the specialist. The bladder ulcerations and painful micturition due to colon bacilli are certainly relieved by the use of autogenous colon vaccine. Dr. J. Lovett Morse has recently described cases of colon infection of the urinary tract in infants causing hitherto unexplained fever, and when looked for, the condition will probably be found to be not uncommon. In these cases, however, the colon vaccine did not prove so helpful as an alkaline diuretic.

The proof of the presence or absence of the gonoccocus in a discharge, may occasionally be of the greatest importance. Mallory and Wright in their Pathological Technique describe a convenient method of staining.

The same authors also describe the different methods of staining the spirochæte pallida in syphilitic conditions.

This text book of Mallory and Wright will be found very helpful, as its directions are explicit, concise and easily understood.

The examination of meningeal, gastric, and intestinal fluids, and of tumors, will probably continue to be the work of those especially trained for this work.

The use of vaccines prepared from killed cultures of bacteria has been found of great advantage in certain cases. In some of the so-called grippe infections a vaccine prepared from the nasal or throat secretions and given with due regard to the opsonic reaction of the blood, has proven of value. Vaccines prepared from staphylococci or streptococci, either autogenous or stock, have proved helpful in certain skin infections, especially furunculosis.

Not every town has an electric lighting current, but where it can be had an x-ray outfit, to be obtained at a comparatively small expense, is a desideratum.

In addition to its use as a therapeutic measure, the x-ray from the ordinary coil will provide us with a skiagraph of the bones, in limbs or chest, or jaw, and so confirm a diagnosis in many doubtful surgical cases.

A suspicious sprain may be proven to be a fracture, or a fracture supposed to have been reduced may show the bones not in proper position. The skiagraphing of the lumbar spine, pelvis and abdominal contents as to renal calculi or enteroptosis, demanding powerful and costly apparatus, and, especially, trained interpretation, must be made by an expert.

A patient had pain, swelling and tenderness of the dorsum of the foot. A photograph showed a swollen periosteum of the third metatarsal.

Another patient fell on her left hand. Three days later she presented herself with hand and arm tense with effused blood, but apparently no deformity. Ordinary manipulation was out of the question—an x-ray photograph showed a fracture of the end of the radius with a slight displacement of the fragment outwards.

The plates may be obtained from any photographic supply house and may be developed by any one accustomed to that work.

Not every one of us can afford to possess all the instruments of diagnosis or precision, nor can any one be adept in the use of them all and keep up his practice. But few are so separated from neighboring practitioners as not to be able to avail ourselves of his special knowledge or apparatus.

Incidentally such use of each other's facilities tends to increase the solidarity of our profession, as it promotes both social and educational activity.

Every one of us needs the special knowledge or experience his brother has acquired, and that brother's support in his everyday work. And it is to the credit of our profession that whatever of value any one may find, he gladly imparts to his brother practitioners.

DISCUSSION.

Dr. Channing Frothingham, Jr., of Boston: Within the last few years laboratory tests as aids to diagnosis have improved very much in efficiency. In the large cities, where there are always several well-equipped laboratories, a practitioner of today has no excuse if he does not avail himself of these opportunities. For the practitioner who is distant from these facilities it has always been more difficult to keep up with the laboratory advances. The result has been that this latter class of physicians have rather neglected the whole question of laboratory tests except under special circumstances.

Dr. Cummings's interesting paper has shown very clearly that a great many of the most useful laboratory tests can be easily and accurately done by physicians at their homes. He makes it clear that in the future, distance from clinical laboratories will be no excuse for unscientific medicine.

Dr. Cummings very wisely differentiates between those tests which are possible in a small closet laboratory and those which are not.

In addition to the laboratory tests which he mentions, I think that there should be the white blood corpuscle count. This is of great value in differentiating fever caused by the pyogenic bacteria from typhoid fever, tuberculosis, and malaria. Also the leucocyte count is of great assistance in the diagnosis of the leukæmias. Of course, along with the leucocyte count an examination of the stained specimen of blood should be made.

The red blood count can also be readily done by physicians away from the laboratory, and though a longer process, the technique is as simple as that of the white count.

Another laboratory test which is much neglected and which is simple is the microscopic examination of the stools. By this method embryos and adult parasites are readily recognized, and eggs of parasites are quite readily distinguished, even by those who do not see them frequently. Another test of value for the practitioner who cannot keep a live culture of typhoid bacilli always at hand, is the macroscopic Widal test. This test seems to be nearly as accurate as the microscopic Widal test.

The amount of equipment necessary to do all these tests mentioned by Dr. Cummings and myself is by no means large. A dozen reagents will cover all the needs in that line, and in addition there must be a little preliminary outlay in blood counters, bunsen burners, centrifugal machine, platinum loop, etc. Space sufficient for a small shelf in a closet, a sink, and a table for a microscope are all that is necessary.

ARTICLE XXX.

A PRACTICAL DIET CHART.

By HORACE D. ARNOLD, M.D.
OF BOSTON.

READ JUNE 15, 1909.

A PRACTICAL DIET CHART.

It will generally be conceded, I think, that although the proper regulation of the diet is an important therapeutic measure, it has received altogether too little attention from the medical profession. To be sure, the subject is not entirely neglected. We give some very general directions as to diet. If there is disturbance of digestion, we exclude some of the more indigestible forms of food. We may go a step farther and furnish our patients with lists of articles of food headed "May Take" and "Do Not Take," and these lists are more or less modified for various diseases. We give liquid nourishment to fever cases, and confine the diet in typhoid fever as far as possible to milk. We stuff our phthisical cases with milk and eggs, try to feed up our debilitated cases, and cut out from the diet of our cases of obesity certain articles that are reputed to be fat producers. We exclude or limit the starches and sugars in diabetes. We know that the diet should be regulated in nephritis so as to spare the kidneys, and yet, somewhat irrationally, we strive to keep the patient as far as possible on milk alone.

Some of these measures are good, as far as they go, some are bad. They are practically all qualitative measures and we pay very little attention to the quantitative regulation of food. That is left too largely to the appetite of the patient or to the judgment of the nurse. The doctor rarely concerns himself seriously with the "trifling" matter of the dose of food. And yet many patients do badly because they get too little nourishment, and more people actually poison themselves by too great quantities of food. Growing fat is comparatively harmless as compared with some other results of overfeeding.

Besides the lack of sufficient knowledge of the fundamental principles of dietetics, the chief reason why physicians have paid so little attention to the quantitative control of diet has been the difficulty of estimating the nutritive value of food in a practical way. The investigations of Atwater and Bryant and others have in recent years furnished in tabular form the necessary scientific data for such calculation, and such information is now easily available.

For a few cents any physician can get from the U. S. Department of Agriculture (Office of Experiment Stations at Washington) Bulletin No. 28, The Chemical Composition of American Food Materials. In this are given tables which express the percentages of the different ingredients of all articles that are commonly used for food. Moreover, some of the more recent books on treatment, and many books on dietetics, contain tables based on this work. And yet the general practitioner stands aghast before the problem of applying this knowledge to every-day diets, and even the expert finds the work difficult and time-consuming.

Is it worth while to attempt a scientific quantitative and qualitative regulation of the complicated diet in adults? Every one admits that such a regulation of food has been of immense value in infant feeding, but there the diet is milk—a comparatively simple form of nourishment—and practical rules have been evolved that make the problems relatively simple. An intelligent application to adults of the same principles of regulation of food will soon convince one that the advantages are as great as in infant feeding. A realization of its importance immediately convinces one of the desirability of devising some way of applying this knowledge practically in every-day practice.

The diet charts which are submitted for your consideration to-day represent an attempt to solve this problem in a practical way. The aim is to put in the hands of the general practitioner and the medical student an instrument that

will enable them to scientifically regulate the diet of patients with comparative ease.

These charts were designed originally as an aid in instruction in the course in dietetics at Tufts College Medical School. The success attending their use there, and the benefits derived from their use in my own practice, have led me to believe that they would be of interest and value to the general practitioner. In order to have a convenient designation, the name of Tufts Medical Diet Chart has been adopted.

The aim is to give on one sheet of paper all the data necessary for arranging and calculating the nutritive value of a diet, and to furnish a convenient means of recording the results. This is accomplished in Chart A. This chart has spaces for recording the diet for five successive days or for five changes of diet at any interval of time.

A supplementary chart (Chart B) is designed to fulfil the same functions for a single day. It offers a convenient means for giving orders to a patient, or for the patient or nurse to record the amounts taken at each meal. From these records the amounts for twenty-four hours can be readily determined and the nutritive value of the food calculated. The results for the day can be transferred, if desired, to Chart A.

The feature which makes these charts practical for use is the information given as to the nutritive value of food *in measures such as are used in every-day life*. A fairly accurate record may thus be obtained with very little inconvenience to the patient. It is perfectly practical to get such a record, even from our less intelligent patients, and the physician's calculations involve only the simplest arithmetical calculations. In cases where great accuracy is desired the food should be accurately weighed. If this is done, that part of the table should be used which gives statistics for 100 grams of each article of food. One hundred

grams is taken as a unit, partly because of the ease in calculation from this basis. It is advantageous also because the statistics of the composition of foods are given in figures that represent the percentage of the three nutritive elements of food, protein, fat, and carbohydrates. These same figures will represent the number of grams of each of these ingredients in 100 grams of the food. Thus the tables furnished on the chart may be readily supplemented from the statistics of more elaborate diet lists. If the patient is to purchase scales for weighing food it will be a matter of great convenience to have the weights in grams. Weights in ounces can, however, be easily changed to the metric system by using the table given for this purpose on the back of Chart A. Ordinary letter scales weigh with sufficient accuracy for most cases, and are convenient to use. Oftentimes it is not necessary to continue weighing everything. After a short time a patient can learn the size of a portion of the common articles of food that weighs 50 or 100 grams or 1 oz., and such food can then be calculated with sufficient accuracy by the eye.

In cases where accuracy by weighing is less essential, the unit of record may be a tablespoonful or other ordinary measure used at meals. In that case that part of the table on Chart A should be used that is headed "Common Measures." Statistics are given in this connection only for the more common articles of food used in dietetics, but from information given on the back of Chart A under the head of "Miscellaneous Data" the weight of "common measures" of other articles can be determined, and the statistics for a "common measure" of any article of food can be readily calculated from the 100-gram table.

The values in all tables on these charts are approximate only,—they do not pretend to extreme accuracy. They are, however, sufficiently accurate for all ordinary purposes,—and are the more practical because all fractions are

TABLE I.

Approximate Values.

100 Grams (⅓-¼ lb) Grams. P.	F.	C.	Cal.	COMMON MEASURE. Measure.	Grams. P.	F.	C.	Cal.	ARTICLES OF FOOD.
									Proteids.
(See Table III.)				1 portion	8	5	5	100	"Proteid Portion."
4	4	4	70	1 pint	20	20	20	350	Milk (whole).
3	.5	5	40	1 ,,	15	2.5	25	200	Buttermilk.
13	10		150	1 egg	8	5.5		80	Eggs (whole).
13			50	1 white	4.5			20	White of egg.
20	5		125	¼ lb.	20	5		125	Meat, lean.
20	20		250	¼ ,,	20	20		250	,, fat.
									Fats.
3.5	20	3.5	200	1 oz.	1	6	1	60	Cream (20%).
3.5	20	3.5	200	½ pint	9	50	9	500	Cream (20%).
	85		800	1 pat. (⅛ oz.)		9		80	Butter.
	100		900	1 tablespoon		15		125	Olive Oil.
10	60		600	Slice (½ oz.)	1.5	9		90	Bacon.
									Carbohydrates.
(See Table III.)				1 portion	4	1	30	140	"Cereal Portion."
2		24	100	1 tablespoon	1		15	60	Rice (boiled).
2		20	90	1 medium	2		20	90	Potatoes ,,
2	.5	12	60	1 tablespoon	1	.5	6	33	Cereal (cooked).
9	1	55	250	Avg. slice	3	.5	15	80	Bread.
10	10	70	400	,, ,,	3	3	20	120	Zwieback.
11	10	70	400	See note.					Crackers.
10	1.5	75	350	1 biscuit	3	.5	22	100	Shredded Wheat.
		100	400	1 teaspoon			6	25	Sugar.
		10	40						Sweet Fruits.
3	1	10	60	1 tablespoon	2	.5	6	40	**Vegetables.**
									Beverages.
									Water.

NOTES:

P. Protein.
F. Fats.
C. Carbohydrates.
Cal. Calories.

CRACKERS: 1 oz. is equivalent to slice of zwieback. 1 lb. of crackers contains P. 50, F. 45, C. 320, Cal. 1900. Count the number of crackers in 1 lb. and divide into the above values to get nutritive values for one cracker.

FOR OTHER ARTICLES SEE OVER.

TUFTS MEDICAL DIET CHART (Chart A).

Diagnosis, Name, Address,

Date,

	Amount for 24 hours.	Total Cal.	Grams for 24 hours. P.	F.	C.	Water oz. or cc.
Total Calories.						
Weight of patient.						
Total grams, P.						
,, ,, F.						
,, ,, C.						
Total Water.						
URINE. 24 hr. amt.						
Urea. Gms. in 24 hrs.						
Sugar. ,, ,, ,,						

(Prepared by H. D. ARNOLD, M.D., Boston.)

TABLE II.

Additional Nutritive Values (Approximate).

100 Grams (⅛-¾ lb.) Grams. P.	F.	C.	Cal.	ARTICLES OF FOOD. (More common articles on other side.)
				LEAN MEATS (in order of nutrition).
20	2		100	Fish, Game, Chicken, Beef, Turkey, Lamb, } F. varies from 2 to 20% according to amount of fat present.
20	20		250	Goose, Lean Ham.
				FAT MEATS.
15	30		350	Mutton, Pork.
15	50		500	Fat Ham.
10	60		600	Bacon.
2	80		700	Salt Pork.
9	2.5	4	75	Oysters.
16.5	2	.5	80	Lobster.
25	33	2	400	Cheese (full cream).
8	10	1	120	,, ,, ,, one ounce.
10	7.5	1.5	115	Scrambled Eggs.
6	4.5	1	70	,, ,, 1 tablespoon.
				LIQUID NOURISHMENT.
2	2	6	50	Gruels (with milk).
5	.5	1	25	Beef Juice, Meat Soups.
3	2	5	50	Soups (average).
8	3	8	90	Fish Chowder.
				STARCHES, etc.
		95	375	Arrowroot.
		90	350	Cornstarch, Tapioca.
		80	325	Sago.
8		80	350	Rice.
9	2	75	350	Flours and Meals.
12	1	75	350	Wheat Flour.
16	7	65	400	Oatmeal.
22	2	60	350	Dried Beans or Peas.
				MISCELLANEOUS.
4	5	30	175	Puddings { Bread, Rice, Indian, Tapioca, Cornstarch.
6	5	12	120	Custard.
6	9	60	350	Cake.
13	48	30	600	Chocolate.
20	30	36	500	Cocoa.

100 Grams (⅛-¼ lb.) Grams. P.	F.	C.	Cal.	ARTICLES OF FOOD. (More common articles on other side.)
				VEGETABLES (Fresh — Cooked).
10		30	160	Butter Beans.
8		22	120	Lima ,,
7	2.5	20	125	Baked ,,
3		20	100	Green Corn.
7		17	100	,, Peas.
2	3	18	110	Mashed Potato.
1.5	2	11	70	,, ,, 1 tablespoon.
3	1.5	16	90	Macaroni (cooked).
2		15	70	Parsnips.
2		10	50	Beets, Carrots, Mushrooms.
2		10	50	Onions, Squash, Turnips.
				FRUITS (Soluble Sugars).
3	3	76	350	Raisins.
		70	280	Dried Fruits.
		20	80	Edible parts of Bananas and Grapes.
		20	80	Fresh Figs, Plums, Prunes.
		15	60	Apples, Pears, Cherries.
		15	60	Currants, Apricots.
		15	60	Blue or Huckle Berries.
		15	60	Bananas (weighed with skins).
		10	40	Lemons, Oranges (edible part).
		10	40	Strawberries, Peaches.
		10	40	Blackberries, Cranberries.
		10	40	Raspberries, Pineapple.
		10	40	Musk Melon (edible part).
		5	20	Lemons, Musk Melon (as purchased).
		5	20	Grape Fruit, Watermelon.
				NUTS (Edible Part).
6	6	40	250	Chestnuts.
25	40	25	550	Peanuts.
20	55	20	650	Almonds.
10	70	15	750	Pecans.
20	60	15	700	Walnuts.
16	65	13	650	Filberts.
17	67	7	700	Brazil Nuts.
28	60	4	650	Butternuts.

"FodderVegetables."— These theoretically have about 5% or less of carbohydrates, but most of it is lost in cooking or is indigestible. The chief nutritive value is in butter, oil, etc., added to them. They are : —

Asparagus, String Beans, Brussels Sprouts, Cabbage, Cauliflower, Celery, Cucumbers, Greens, Lettuce, Pumpkin, Radish, Rhubarb, Spinach, Tomatoes.

TABLE III.

PROTEID PORTION. (Unit = Protein in one egg, 8 grams.) P.	F.	C.	Cal.		CEREAL PORTION. (Unit = 4 grams of Protein.) P.	F.	C.	Cal.	(Cooked foods.)
8	5	5	100	**Average "Portion."**	4	1	30	140	**Average "Portion."**
8	5.5		80	Egg, one.	4	2	24	135	Cereal, 4 tablespoons.
					4		60	240	Rice, 4 tablespoons.
8	8	8	140	Milk, 1 glass (200 cc.).	4	2	20	120	Macaroni, 4 tablespoons.
7.5	1.25	12.5	100	Buttermilk, ½ pt.	4	2	20	120	Vermicelli, 4 tablespoons.
					4		40	180	Potatoes, 2 moderate-sized.
8	5		80	{ Meat or } 1⅓ ounces or { Fish, } ⅓ serving.	3	.5	15	80	Bread, 1 oz. (or slice).
					3	3	20	120	Crackers, 1 oz.
					3	.5	22	100	Shredded Wheat, 1 biscuit.

PRINCIPLES OF DIETETICS.

Height.	Weight.
4 ft. 8 in.	70 lbs.
,, 9 ,,	75 ,,
,, 10 ,,	80 ,,
,, 11 ,,	90 ,,
5 ft.	100 ,,
,, 1 in.	110 ,,
,, 2 ,,	120 ,,
,, 3 ,,	130 ,,
,, 4 ,,	135 ,,
,, 5 ,,	140 ,,
,, 6 ,,	145 ,,
,, 7 ,,	150 ,,
,, 8 ,,	155 ,,
,, 9 ,,	160 ,,
,, 10 ,,	165 ,,
,, 11 ,,	170 ,,
6 ft.	180 ,,
,, 1 in.	185 ,,
,, 2 ,,	190 ,,
,, 3 ,,	200 ,,

The unit for the measurement of nutrition is the chemical heat-unit, or *calorie :* — the amount of heat necessary to raise the temperature of one kilogram of water one degree centigrade.

1 gram	protein	will produce	4 cal.
1 ,,	fat	,, ,,	9 ,,
1 ,,	carbohydrate	,, ,,	4 ,,
1 ,,	alcohol	,, ,,	7 ,,

NUTRITION FOR 24 HOURS.

An adult requires in 24 hours :

At rest	14-16 cal. per lb.
Light work	16-18 ,, ,, ,,
Moderate work	18-20 ,, ,, ,,

In calculations take the *normal* weight corresponding to height. (See table.)

An average-sized man requires :

At rest	2,000 cal. in 24 hours.
Light work	2,500 ,, ,, ,, ,,
Moderate work	3,000 ,, ,, ,, ,,

Children.— Owing to the relatively greater surface in proportion to weight, the loss of heat is relatively greater in children and they require a higher number of calories per pound.

Age.	Weight.	Cal. per lb.	Cal. in 24 hrs.	Grams P. in 24 hours.
0- 6 mos.	7-15 lbs.	45-35.	315-525.	1 gram per lb.
6-12 ,,	15-20 ,,	35.	525-700.	,, ,, ,,
2 yrs.	30 ,,	35.	1,050.	,, ,, ,,
4 ,,	40 ,,	35.	1,400.	Average 55. Minimum 32.
8 ,,	50 ,,	28.	1,400.	,, 60. ,, 36.
12 ,,	70 ,,	23.	1,610.	,, 75. ,, 44.

PROPORTIONS IN MIXED DIET.

	P.	F.	C.	Cal.
Moderate work	90	80	400	2,800
Minimum	50	50	300	1,900
Maximum	150	150	500	4,000

PROTEIN.

Fifty grams needed, except for a short time as in nephritis. A light protein diet contains 60 grams, which may be made up from 5 "Proteid Portions" and 5 "Cereal Portions." (See Table III.)

FATS.

Use Cream, Butter, Olive Oil, Fat Meats, ordinarily 50-100 grams daily. Undesirable to go above 150 grams.

CARBOHYDRATES.

300 grams is enough for persons exercising moderately. 500 grams is the maximum that can be digested, and is enough for extreme physical exertion and cold. Carbohydrates are practically eliminated from strict diabetic diet.

WATER.

Besides what is taken in "dry food," fruit, and beverages, give 1,000 cc. or 5 glasses as water.

MISCELLANEOUS DATA.

1 large grape fruit	20 oz.
1 ,, orange	10 ,,
1 medium ,,	5 ,,
1 ,, apple	6 ,,
1 ,, banana	6 ,,
(without skin)	5 ,,
Potato size of egg	2 ,,
1 square Baker's chocolate	1 ,,
Lean part of lamb chop weighs	1 ,,
Thin slice of beef weighs	1 ,,
1 cubic inch of meat weighs	1 ,,

Meat loses 25% water in cooking.

1 slice of bread weighs 1 oz.	= 80 cal.
1 large roll weighs 2 ozs.	= 160 ,,
1 shredded wheat biscuit, 1 oz.	= 100 ,,

Crackers.— For large crackers, count the number in 1 lb. (see other side). For small crackers calculate the average weight of each by weighing a given number. Get caloric value by calculating 1 gram of cracker equivalent to 4 cal.

A small teaspoon or lump of sugar weighs about 6 grams = 25 cal.

Fruit sauces = 25% sugar.

Candy.— Estimate as 400 grams sugar to a pound.

1 kilogram (35 ozs.)	= 2¼ lbs.
453.6 grams (450 or 480 grams)	= 1 lb.
30 ,,	= 1 oz.
1 gram	= 15 gr.
1 litre (34 fld. ozs.)	= 1 qt.
⅛ ,, (17 ,, ,,)	= 1 pt.
Tumbler or coffee cup (full)	= 250 cc.
Tablespoon (½ oz.)	= 15 ,,
Teaspoon (⅓ oz.)	= 5 ,,
4 level tablespoons of flour	= 1 oz.
2 ,, ,, butter	= 1 ,,
2 ,, ,, granulated sugar	= 1 ,,

In serving cereal and vegetables a tablespoonful is a heaping one and weighs about 2 ozs., 60 grams.

INSTRUCTIONS.

The tables give the composition of ordinary articles of food. The values are approximate only, but are sufficiently accurate for practical use.

The tables are based chiefly on Atwater and Bryant's statistics. (The Chemical Composition of American Food Materials, Bulletin 28, U. S. Dept. of Agriculture. Experiment Stations.) Other authorities have also been consulted.

Table I contains the articles of food which are most commonly employed. Blank spaces are left where the data about other articles of food may be inserted. For this purpose the figures may be obtained from Table II or from any standard authority on dietetics.

If great accuracy is desired, the articles of food should be weighed on accurate scales, but in many cases sufficient accuracy will be attained by using that part of Table I in which the statistics are given for ordinary measures of food.

The spaces to the right of the List of Articles in Table I are for a summary of the nutriment for 24 hours. There is space for records for five days.

Day Record.

The first column is for the total daily amount of each article of food used. In the second column is to be placed the corresponding value of each article of food, expressed in calories. This is easily calculated from one or the other calorie column in the table according as the amount of food is expressed in grams or in "rough measures." The number of grams of P, F, and C can be calculated easily from the table in a similar way.

A daily record of the number of grams of a given form of nutriment is often of very great value. For example, in nephritis the total daily grams of protein; and in diabetes the total daily grams of carbohydrates.

The last column is for a record of the amount of water ingested daily.

The totals for the day are summarized at the bottom of the page in the corresponding columns. For convenience a dot indicates the space where each record should be placed. A space is also indicated for the weight of the patient.

The amount of urine is recorded in the water column, for easy comparison with the amount of fluid ingested. Similarly the amount of urea is compared with the protein ingested, and the amount of sugar in the urine with the amount of carbohydrates ingested. It should be remembered, however, that in severe diabetes some sugar may be derived from proteids — that 60 grams of glucose can be formed from 100 grams of albumen

The daily records can be compared by glancing along the line from left to right.

omitted and the nearest *convenient* figure is chosen. Furthermore, the values in many instances represent an average for closely allied foods. For example, the differences between the various forms of cereals are so slight in the amounts eaten in a day that they may be disregarded in practical work. The same is true of the different forms of bread. The figures given represent an average of the kinds commonly used.

The unit for the measurement of the nutritive value of food is the chemical heat-unit, or calorie. One gram of Protein theoretically produces 4.1 calories; and one gram of Fat 9.3 calories; and one gram of Carbohydrates 4.1 calories. Practically we may count one gram of Protein as 4 calories, one gram of Fat as 9 calories, and one gram of Carbohydrates as 4 calories. After calculating the total nutritive value of a given amount of food in this way the nearest convenient round number has been taken in making up the table. This value of course is only an approximate one, but it is sufficiently accurate and the results are surprisingly close to calculations by more elaborate methods.

Table I contains the articles of food most commonly employed in dietetics. Blank spaces are left where other articles of diet may be added. Most of these articles will be found in Table II on the back of Chart A, and still others may be obtained from the more detailed diet tables of standard authorities.

In the use of Chart A the first step is to make the list in Table I complete, by adding the names of any other articles of food that the patient may have taken. It will be more convenient if we complete the statistical part of the table also for each of these new articles of food. Table I is then a complete one for the case in question.

We now proceed to make a record for a day in one of the five sections on the chart. At the top the date is placed. In the first column is recorded opposite each name

the amount of that food used in 24 hours. This amount may be expressed in grams, ounces, or "common measures," whichever is most convenient. According as the amount is stated by weight or by "common measure," we use the first or the second part of our statistical table to calculate the caloric value of each article of food. The figure representing the caloric value for 24 hours is placed in the second column on the same line with the name of the food.

If it is desirable to know the number of grams of protein, fat, or carbohydrates, it is calculated from the table in a similar way and it is recorded in its proper column. The last column is for a record of the amount of water, although it is not intended that the amount in "dry" food should be counted.

At the bottom of the page the totals for the day are summarized in the proper columns. A separate line is allowed for each one so that the results on successive days may be compared by glancing across the page from left to right. For convenience of comparison the amount of urine is recorded in the same column with the water ingested, the amount of urea is in the protein column, and the amount of sugar in the urine is in the carbohydrate column. A space is reserved for the weight of the patient. A short dash in each case indicates the proper space in which to make the record.

On the back of Chart A, besides the statistical data in Table II, are given directions for using the chart, a brief abstract of the principles of dietetics, and various other useful data.

The proper amount of nutrition for 24 hours is a matter of considerable importance. If the amount is sufficiently reduced below normal, the patient loses weight and strength. Again, a person cannot build up from a debilitated condition on an insufficient supply of nourishment. On the other hand, a large majority of the cases of obesity

are due to eating too much. Individual peculiarities, of course, exist. We have all seen the fat man who eats little and the glutton who remains thin. Nevertheless, the average need of the average healthy man is sufficiently constant to establish a normal standard. This standard is estimated at a certain number of calories a day for each kilogram of weight,—or, as we have planned it, so many calories per pound. In making your calculations, however, it is important not to take the actual weight of the patient (which may be abnormally high or low), but to take the *normal* weight for the patient's height. A table for this purpose is given on the back of Chart A.

The proper amount of nutrition in twenty-four hours for an adult varies from 14 to 20 calories per pound of normal weight, according as the person is at rest, doing light work, or at moderately heavy work. For example, a man 5 ft. 7 inches in height should weigh 150 lbs., and at light work should receive 150 x 16 calories=2400 calories. On this he should just maintain his weight. If as a result of overfeeding his weight were 200 lbs., it would be absurd to calculate nutrtion on the basis of this excessive weight. He would then get 200 x 16 calories=3200 calories, and would gain still more. In such a case of obesity we should endeavor to reduce his weight by giving less than the normal requirement of 2400 calories,—say 2000 calories,—and the balance of the needed nourishment would be made up by burning up his superfluous fat.

Exactly the reverse would be true if the man were emaciated through too little nourishment. If, for example, he weighed only 100 lbs., he could hardly expect to build up on 1600 instead of 2400 calories.

A case in point, which illustrates the advantage of an accurate calculation of the diet, is as follows: A patient who came under my charge a year and a half ago was 5 ft. 10 inches in height and weighed 190 lbs. His normal

weight should have been 165 lbs. He had interstitial nephritis and a weak heart. The elimination by the kidneys was so much impaired that it had to be supplemented by free, watery movements of the bowels. If the bowels became sluggish he had an attack of acute pulmonary œdema of an alarming degree. Indigestion also caused the same kind of an attack.

He was a hearty eater, with an excess of proteids in his diet. General directions were given which reduced the albuminoid food especially, and his diet was limited moderately and then reduced until he gradually began to lose weight. In the course of three months he had lost 10 lbs., and weighed 180. Six months later he weighed 175 lbs. All this time his strength and general condition had improved, although he still had accasional attacks of pulmonary œdema.

This weight was maintained for several months, and then for no apparent reason he began to lose weight steadily. His heart got worse, and his attacks of pulmonary œdema increased in frequency. Inquiry as to his diet seemed to indicate that it remained essentially the same, and I naturally assumed that his disease had reached the stage where he must gradually lose ground, and that the end was not far removed. When his weight reached 150 lbs. his condition was rather desperate. I had felt all along that his diet was properly regulated, and I had not, therefore, calculated its caloric value. I now did this and to my surprise found that he was taking only 1400 calories instead of about 2500 which he should have had.

Owing to the association of his attacks with indigestion he had become afraid to eat much, and insufficient nourishment had resulted. A careful revision of the diet, raising it first to 2000 and later to about 2500 calories, produced remarkable results. In two months he had gained 15 lbs., he felt stronger than he had for months, and he had had no

more attacks. He was not, as I thought, in the last stages of his disease, but was *allowed to partially starve himself under my observation* simply because I had not regulated the diet quantitatively as well as qualitatively,—because I had given general directions and was satisfied with his general reports that he was adhering to the diet ordered and was "getting all he wanted to eat."

This is not an isolated case. The proper regulation of the amount of nutrition is of importance in many conditions. While the figures given in the tables offer a standard for general guidance, it is also true that individuals vary as to their needs. Occasionally a person maintains weight on a surprisingly small caloric valve of the diet, and sometimes a large increase fails to add to the nutrition of the patient.

It is for various reasons frequently unnecessary to estimate the caloric need for 24 hours very accurately. For an average-sized adult we may prescribe a diet of 2000 calories if at rest, 2500 if at light work, and 3000 if at active work. We can then raise or lower the amount according as we get the desired results or fail to get them. The weight and general strength taken together are reliable guides as to the efficiency of diet regulation.

Besides regulating the total daily amount of nutriment, it is often essential to regulate the amount of protein, fat, or carbohydrates ingested. It is now generally recognized that if we are to treat diabetes intelligently we should know the amount of carbohydrates ingested. We should also determine the point of "carbohydrate tolerance," and should keep the number of grams of carbohydrates in the diet safely below that point. This can be readily planned on our chart.

It is not always as fully recognized that in disease of the kidneys the ingestion of protein should be watched as closely and regulated as carefully as are the carbohydrates in diabetes. Yet surprising improvement will often follow if this is done.

The chart lends itself readily to the regulation of the amount of any of these three ingredients of the food. By glancing up and down the proper column in our statistical table you can see at a glance what articles contain none of the particular ingredient in question, and which of them contain but a small amount. We select our diet from these articles and avoid especially those that have a large percentage.

At the same time that we are regulating the amount of any one of the ingredients of food, we must nevertheless keep in mind the importance of the total caloric value of the diet for the day. It is easy enough to regulate either one of these factors if we disregard the other, but both must be properly arranged if we are to attain success. Sometimes we find the amount of a certain ingredient of the food has been cut down instinctively by the patient himself. This may have come either because he developed a dislike for this class of food, or because he noticed that such food disagreed with him—however much he might like it.

A recent case, a woman who has interstitial nephritis and mitral stenosis and regurgitation, is interesting in this connection. She was losing weight and strength rapidly, and her heart was beginning to give out. The kidney disease was well advanced and the elimination power of the kidneys was considerably reduced. She had gradually reduced her diet, instinctively guided to a low proteid diet. A calculation of that diet for a period of four days showed that she was getting an average of only 50 grams of protein a day. This was satisfactorily low,—but she was getting on the average only 1150 calories in a day. Her height is 5 ft. 2 inches. Her normal weight should be 120 lbs., whereas she weighs 106,—having lost 20 lbs. in the past nine months. Her estimated caloric need for a day would be $120 \times 16 = 1920$ calories. She had been getting 1150 calories,—or only 60 per cent. of her normal amount of nourishment.

The problem was to increase her nourishment without materially increasing the amount of protein in her food. Furthermore, the problem in this case was complicated by the fact that she took her meals at restaurants and had to be very economical in her expenditure of money for food. By the aid of the chart a satisfactory diet was planned to meet all these requirements. While its caloric value was 2300, it contained only 70 grams of protein. The caloric value had been advanced 110 per cent., although the amount of protein had been increased only 40 per cent. This amount of 70 grams was within the capacity of her kidneys, and her general condition improved.

The question of variety in diet is an important one. This is especially true where a diet is arranged to cover a long period. No matter how satisfactory a given diet may be made, the patient will soon tire of it if it is not changed. While the patient is acutely ill and the doctor is in close attendance, changes in diet can be easily made. But when the patient feels well and is able to look out for himself otherwise, he will rarely consult the physician merely for a slight change of his food. He will seek variety on his own responsibility, and is likely to cause serious injury.

In order to make a success of the diet in such cases, we must plan for variety and yet control the caloric value and the amount of the important ingredients. As a means of accomplishing this end in cases where the amount of protein is the important thing to regulate, I have designed the scheme of the "Proteid Portion" and the "Cereal Portion" given in Table III.

Under the head of "Proteid Portion" are given the commoner articles of diet that are rich in protein:—eggs, milk, buttermilk, meat and fish. The unit for comparison is the amount of protein in one egg, or 8 grams. The amount of each article of food that furnishes 8 grams of protein is stated in the table and constitutes one "portion." You can

then order a certain number of "portions" and allow the patient to choose that number in any combination he wishes. He thus gets variety, but the number of grams of protein remains the same.

Under the head of "Cereal Portion" are grouped a number of the staple articles of diet, such as bread, cereal, rice, etc. They are less rich in protein, but contain enough so that the amount taken must be regulated if the protein ingestion is to be restricted. The unit of the "Cereal Portion" is 4 grams of protein,—the amount in a good serving of cereal or an average slice of bread. Here again you can order a certain number of "portions," you can allow your patient to choose his own combination to make up this total, and yet you still regulate the amount of protein that is taken. A light protein diet contains about 60 grams of protein, and would be made up of 5 "proteid portions" and 5 "cereal portions."

These tables may be enlarged and even greater variety secured by adding other articles in amounts furnishing the same amount of protein. Similar tables of equivalent "portions" can readily be constructed for other purposes. For example, a table for "carbohydrate portions" can be constructed for diabetes. The unit for such a table of "carbohydrate portions" would vary with the carbohydrate tolerance of the patient, and such a table is therefore left to the ingenuity of the physician and is not incorporated in the chart.

The diet in diabetes can be easily arranged on this chart. Those articles that are free from carbohydrates can be recognized by a glance at the tables, and a diet of sufficient caloric value can be arranged. To this the "fodder vegetables" may be added; and this practically constitutes the "strict" diabetic diet. To this may be added in suitable cases a definite amount of carbohydrates. Variety may be secured by constructing a table of "carbohydrate portions,"

TUFTS MEDICAL DIET CHART (Chart B).

Day Order and Record Chart.

Name,

Address,

Diagnosis,

Date,

Record the Amounts of Food in Grams, Ounces, or "Measures" (see table).

FOOD ORDERED.	FOOD TAKEN.	APPROXIMATE VALUES. 100 Grams (⅙-¼ lb.) Grams. P.	F.	C.	Cal.	COMMON MEASURE. Measure.	Grams. P.	F.	C.	Cal.	ARTICLES OF FOOD	SUMMARY FOR 24 HOURS. Amount for 24 hours.	Total Cal.	Grams for 24 hours. P.	F.	C.	Water oz. or cc.
Breakfast (at A.M.)	**Breakfast** (at A.M.)																
						1 portion	8	5	5	100	**Proteids.** "Proteid Portion."						
		4	4	4	70	1 pint	20	20	20	350	Milk (whole).						
		13	10		150	1 egg	8	5.5		80	Eggs (whole).						
		20	5		125	¼ lb.	20	5		125	Meat, lean.						
		20	20		250	¼ ,,	20	20		250	,, fat.						
Lunch (at A.M.)	**Lunch** (at A.M.)	3.5	20	3.5	200	1 oz.	1	6	1	60	**Fats.** Cream (20%).						
			85		800	1 pat. (⅛ oz.)		9		80	Butter.						
			100		900	1 tablespoon		15		125	Olive Oil.						
		10	60		600	Slice (½ oz.)	1.5	9		90	Bacon.						
Dinner (at P.M.)	**Dinner** (at P.M.)																
						1 portion	4	1	30	140	**Carbohydrates.** "Cereal Portion."						
		2		24	100	1 tablespoon	1		15	60	Rice (boiled).						
		2		20	90	1 medium	2		20	90	Potatoes ,,						
		2	.5	12	60	1 tablespoon	1	.5	6	33	Cereal (cooked).						
		9	1	55	250	Avg. slice	3	.5	15	80	Bread.						
		10	10	70	400	,, ,,	3	3	20	120	Zwieback.						
Lunch (at P.M.)	**Lunch** (at P.M.)	11	10	70	400	See note.					Crackers.						
		10	1.5	75	350	1 biscuit	3	.5	22	100	Shredded Wheat.						
				100	400	1 teaspoon			6	25	Sugar.						
Supper (at P.M.)	**Supper** (at P.M.)																
				10	40						Sweet Fruits.						
		3	1	10	60	1 tablespoon	2	.5	6	40	**Vegetables.**						
Lunch (at P.M.)	**Lunch** (at P.M.)																
											Beverages. Water.						
											Total Calories.		–				
											Weight of patient.	–					
											Total grams, P.			–			
											,, ,, F.				–		
											,, ,, C.					–	
											Total Water.						–
											URINE. 24 hr. amt.						–
											Urea. Gms. in 24 hrs.			–			
											Sugar. ,, ,, ,,					–	

DIRECTIONS FOR USE OF DAY ORDER AND RECORD CHART.

Either side of this chart may be used, as is most convenient. On the other side the amount of each article of food ordered for 24 hours is recorded, and the division among the meals is left to the discretion of the patient or nurse. If the physician wishes to give orders for each meal, this side of the chart should be used.

Only the commonest articles of food are printed on this chart. Blank spaces are left where additional articles may be added. The nutritive values of such articles may be found in standard books on dietetics, or may be obtained from the tables of the larger **TUFTS MEDICAL DIET CHART,** which also contains other valuable information.

(Prepared by H. D. ARNOLD, M.D., Boston.)

TUFTS MEDICAL DIET CHART (Chart B).

Day Order and Record Chart.

Name,

Address,

Diagnosis,

Date,

ARTICLES OF FOOD.	Record the Amounts of Food in Grams, Ounces, or "Measures" (see table). FOOD ORDERED.	FOOD TAKEN. Breakfast.	Lunch.	Dinner.	Lunch.	Supper.	Lunch.	Amount for 24 hours.	Total Cal.	Grams for 24 hours. P.	F.	C.	Water oz. or cc.
Proteids.													
"Proteid Portion."													
Milk (whole).													
Eggs (whole).													
Meat, lean.													
,, fat.													
Fats.													
Cream (20%).													
Butter.													
Olive Oil.													
Bacon.													
Carbohydrates.													
"Cereal Portion."													
Rice (boiled).													
Potatoes ,,													
Cereal (cooked).													
Bread.													
Zwieback.													
Crackers.													
Shredded Wheat.													
Sugar.													
Sweet Fruits.													
Vegetables.													
Beverages.													
Water.													

APPROXIMATE VALUES. 100 Grams (⅛-¼ lb.) Grams. P.	F.	C.	Cal.	COMMON MEASURE. Measure.	Grams. P.	F.	C.	Cal.
				1 portion	8	5	5	100
4	4	4	70	1 pint	20	20	20	350
13	10		150	1 egg	8	5.5		80
20	5		125	¼ lb.	20	5		125
20	20		250	¼ ,,	20	20		250
3.5	20	3.5	200	1 oz.	1	6	1	60
	85		800	1 pat. (⅛ oz.)		9		80
	100		900	1 tablespoon		15		125
10	60		600	Slice (½ oz.)	1.5	9		90
				1 portion	4	1	30	140
2		24	100	1 tablespoon	1		15	60
2		20	90	1 medium	2		20	90
2	.5	12	60	1 tablespoon	1	.5	6	33
9	1	55	250	Avg. slice	3	.5	15	80
10	10	70	400	,, ,,	3	3	20	120
11	10	70	400	See note.				
10	1.5	75	350	1 biscuit	3	.5	22	100
		100	400	1 teaspoon			6	25
		10	40					
3	1	10	60	1 tablespoon	2	.5	6	40

"PROTEID PORTION." Each of the following "portions" contains the same amount of protein as one egg (8 grams). One egg; 200 cc. (1 glass) of milk; ½ pint buttermilk; 1⅛ ounces (⅛ of a serving) of meat or fish.

"CEREAL PORTION." (Each contains about 4 grams of protein.) 4 tablespoons of cooked cereal, or rice, or macaroni or vermicelli; 2 moderate-sized potatoes; 1 slice (ounce) of bread; 1 ounce of crackers; 1 shredded wheat biscuit.

Total Calories.	–		–		
Weight of patient.	–				
Total grams, P.			–		
,, ,, F.				–	
,, ,, C.					–
Total Water.					–
URINE. 24 hr. amt.					–
Urea. Gms. in 24 hrs.			–		
Sugar. ,, ,, ,,					–

NOTES:

P. Protein.
F. Fats.
C. Carbohydrates.
Cal. Calories.

CRACKERS: 1 oz. is equivalent to slice of Zwieback.
1 lb. of crackers contains P. 50, F. 45, C. 320, Cal. 1900. Count the number of crackers in 1 lb. and divide into the above values to get nutritive values for one cracker.

or a chart may be given the patient on which are checked those articles containing 5, 10, or 15 per cent. of carbohydrates, and the patient is allowed a certain weight of each group. For convenience in this matter the articles of food in Table II are grouped in the order of their carbohydrate content.

The limitations of time prevent the giving of details illustrating the use of the charts in other diseases. It is enough to state that the charts are applicable to any condition where it is desirable to regulate the diet.

After the explanations about Chart A, the use of Chart B is easily understood. The object of this chart is to furnish a convenient means of giving orders to the patient, and for the patient or nurse to record the amounts of food taken at each meal. One side of the chart is intended for use when the physician gives his orders by the day, and the other side if he wishes to give orders for each meal. In either case the amounts for the day can be easily made up from the records and the calculations made for the day. This chart may be used as a permanent record, or the results may be transferred to Chart A.

SUMMARY.

Scientific work in connection with the diet must be based on the caloric value of foods, and the amount of each of the three ingredients (protein, fats and carbohydrates) contained in the food.

The quantitative regulation of food is as important as its qualitative regulation.

These charts give all the data needed in the practical regulation of the diet in such a form that calculations about the diet can be readily made and the results can be conveniently recorded.

They are applicable whenever the diet needs regulating in any condition.

DISCUSSION.

Dr. Franklin W. White, of Boston: It is perhaps a fair question to ask why we should use such a diet chart as this. It looks rather complicated at first, and I am afraid some members of our profession are not on speaking terms with the calorie. Is this chart a practical matter, or is it only a frill? Do we really need it?

I think we do need it; some of us need it badly, and for this reason, because our knowledge of food values is far too small and too much neglected, and because this chart will help us to a better knowledge of food values.

We know about drugs and their doses, and we keep careful account of the amount we use, but we are accustomed to order our foods in a much more careless fashion. We do not know their doses, and do not pay enough attention to daily amounts or total quantities. Perhaps it was not sufficiently emphasized in our medical training, and we have fallen into bad habits. It is worth while to remember that while some of our patients take drugs, all of them take food.

What is the result? Some of our patients get fat and we cannot make them thin; some get thin and we cannot fatten them up. The doctor gives a liquid diet without realizing the great difference in the food value of different liquids, and the patient is dangerously starved without the doctor knowing it. Another patient may be dangerously over-fed for the same reason.

Food values are not the whole thing. Quality and digestibility count, but we are too much inclined to forget amounts. We do not add up the total foods taken per day, or if we do, it is in gross amounts—so much bread, so many eggs, so much milk, not reduced to their simplest terms—calories. We ought to become familiar with the calorie. There is no more reason to avoid it than the grain or drachm. It is the only way we can bring all foods to a common level and get an idea of the total value of the day's rations. This is just what the chart enables us to do. Its greatest value in my opinion lies in educating the doctor in the values of the foods he has ordered.

One of the greatest mistakes in the past in typhoid fever and gastric ulcer has been to treat the patient's bowel or stomach and to forget the patient as a whole—his nutrition. I was very much impressed with a paper read at the last meeting of the American Medical Association, in which 45 cases of typhoid fever were cited which were carried through their illness without any loss of weight. The doctor had succeeded in getting them to take from 4000 to 5000 calories a day. If we use this chart we shall not give our patient one-half or one-fourth or one-tenth of the amount of food needed per day without knowing it. We shall have the facts staring us in the face in our daily total.

I was much interested when abroad in going into one of the baby hospitals in Berlin. At the bed of each child was a chart which showed just how many calories of food the baby had taken each day. That is a very valuable thing. It would be an eye-opener to do this with many of our adult patients, and would prevent both dangerous over-feeding and starvation. The chart enables us to do this. If you ask a doctor whether his patient is taking sufficient food, he does not know; he guesses at it. This chart will enable him to know.

One reason we waste our patients' money on patent foods and have such exaggerated ideas about them, is that we do not know how to compare their value with plain foods. If we did, their relative uselessness would be seen at once.

The plan of combining condensed tables of food values with the daily record is valuable, for it brings together on one sheet all the data needed for calculation of total food values or of total proteid or total carbohydrate eaten. The arrangement of the totals for a day is excellent for the comparison of the total carbohydrates eaten with the amount of sugar in the urine in diabetes, and for comparison of the total proteids eaten with the total urea in the urine; for example, in nephritis, and for comparison of the total amount of urine with the amount of water drunk. It is always a surprise to me to find how frequently the amount of urea in the urine is estimated without knowing the total amount of proteids eaten. No factor so influences the total urea excretion as the amount of proteids eaten, and to estimate the amount of urea without estimating the proteids in the diet is not only useless but may be misleading.

There are a few things which perhaps might be criticized. It is of course impossible to arrange any chart in a perfect fashion at the outset. It will be necessary for the doctor who uses the chart to calculate more values of common measures of food in addition to those given, in order to get his results quickly; for example, of soups, vegetables, fruits, simple desserts, ice cream, etc. These can put in in the blank spaces in Table I.

To illustrate what I mean, take the orange. In Miscellaneous Data we find that one medium orange weighs 5 oz. One ounce equals approximately 30 grams. In table II we find that 100 grams of orange has a food value of 40 calories and contains 10 grams of carbohydrate, and thus we can calculate the value of the orange and write it down in Table I for future use.

One other trifling detail. The table of the Day Order and Record Chart of food taken reads, "Calories, Proteids, Fat, Carbohydrate." The food values read in another order, "Proteid, Fat, Calorie, Carbohydrate." It might be more convenient if both were given in the same order.

These are minor details, however. The chart is carefully worked out and has a great deal of practical worth in my opinion in teaching us food values.

Dr. Ralph C. Larrabee, of Boston: I agree with Dr. White and Dr. Arnold as to the need of more attention on the part of practitioners of medicine to these matters. But our present slipshod methods are not altogether our own fault. They are due rather to the difficulties which have attended calculations of the sort we are discussing. Such calculations have been made mostly by chemists and laboratory workers for scientific, rather than for everyday practical purposes, and for such purposes great accuracy of detail is of course needed. For practical work such accuracy must give way to simplicity. Dr. Arnold's chart supplies us with a simple means of obtaining results which are accurate enough for our purpose—the treatment of the sick. I do not see how the thing could be made any easier. At the same time, some will find the chart hard to use. Mathematics comes hard to the medical mind. Some of us find it so hard to think in percentages that we cannot even do it in infant feeding where milk only is used, and even with

this chart the present matter is far more complicated. Most of us, however, will find that with a little thought and a little practice the use of the chart is easy. Dr. Arnold is to be congratulated for making a difficult matter much more simple.

Dr. Richard Hogner, of Boston: In my opinion, almost every table giving the figures for the relation between weight and height are quite in favor of the weight.

Dr. Arnold (closing the discussion): At the present time the charts will have to be procured from me. I have been trying to get some publishers interested, and I have negotiations under way now which I hope will be successful. I shall be glad in the mean time to supply anybody with charts.

In this connection I was rather interested in a comment on the medical profession made by some of the publishers. They said to me:—"The general practitioner is not capable at present of using these charts; there is no market for them." This is the comment of the practical men who are selling things to the profession, and I do not know of any harder criticism on the profession in regard to their knowledge of diet.

If I may be allowed to speak of one or two things without taking up too much of your time, I will do so.

The results that may be accomplished in some cases by a proper regulation of the diet have been a revelation to me, and they must be to many of you. Take, for example, the point spoken of by Dr. White in reference to the paper recently read at Atlantic City. The idea that it is possible to feed typhoid fever patients so that they do not lose weight is a surprise to most of us. I had a talk with the author of that paper, Dr. Warren Coleman, of New York, and was much interested in his methods of dieting these cases. They have a practical bearing on some of the problems I have laid before you to-day.

Dr. Coleman found it necessary, in preventing the loss of weight in these cases, to give upwards of 4000 calories in a day. Let us take 4200 calories as a convenient figure, and enquire how much milk—the food usually given to a typhoid fever patient—would be required to furnish this number of calories. From our table we know that 70 calo-

ries are furnished by 100 cc of milk. It would therefore require 60 times as much—or 6000 cc—to furnish 4200 calories. This is 6 litres, or approximately 6 quarts,—an impossible amount for such a patient to take day after day. It is, then, impossible to prevent the serious loss of weight in typhoid fever so long as we stick to a diet of milk alone.

Furthermore, if you desire to arrange a better diet for this purpose, you must know about the caloric, or nutritive value of the different articles of food that may be used. Dr. Coleman's solution of the problem was to use a moderate amount of milk, to which was added a few eggs, and then cream and milk sugar were added in amounts sufficient to make up the desired total amount of nutriment.

A case which occurred in my own practice this winter was another revelation,—all the more striking because it occurred while I was working out some of these problems and because it shows so clearly the importance of the *quantitative* regulation of the diet. The patient had been under my charge for a year and a half with serious disease of the kidneys and heart. The diet had been carefully regulated qualitatively, and the amount of proteid food had been roughly restricted. He started with a weight of 190 lbs., whereas his weight should have been 165 lbs. A gradual loss of weight, without loss of strength, to 175 lbs., was welcomed, and then he remained for months at that weight. Last fall there came a change for the worse. He lost weight rapidly. There was a marked loss of strength. The attacks of pulmonary œdema, which he had had occasionally, now became more frequent and much more severe. It seemed to me in March that his disease was approaching a fatal termination, and that he could not live more than two months. His weight had dropped to 150 lbs.

At this point, rather in a spirit of investigation than because I hoped to do much in the way of benefit, I calculated the exact amount of nutriment that he took in a day. I had not done this before, because I thought that his diet was already satisfactorily arranged, and he repeatedly assured me that he was getting "enough to eat." To my surprise I found that he was getting only 1400 calories instead of 2300 which he should have had. Careful enquiry now showed that he had associated his attacks of pulmonary

œdema with slight changes in his food, and that he had become afraid to eat and had thus gradually cut his diet down to where it was far too low. I now carefully regulated his diet quantitatively as well as qualitatively, taking care that the nutritive value was sufficient. The results were surprising. Instead of a fatal termination, in two months he had improved marvellously. He had gained 15 lbs. (up to his normal weight), he had gained in strength so that he felt as strong as a year before, and he had had no more attacks of pulmonary œdema although such attacks had been coming every two or three weeks. I had been allowing this man to starve under my own eyes, simply because I did not accurately estimate the nutritive value of the food that he took. How many such cases do we let die through ignorance? (Note. Two months later, in July, this improvement still continues uninterrupted.)

Dr. White's suggestion that more "household measures" on the chart would add to its convenience is a good one, and would make our calculations easier, but I found my space too limited for this. This is not designed to be a wall chart, but to be of such size that it can be conveniently folded up and carried in the pocket. I felt that it was unnecessary to elaborate Table II by giving "household measures." In any individual case the calculation can be made easily from the figures in the table together with the information given under the head of "Miscellaneous Data." This calculation, when once made and recorded in Table I, will not have to be repeated on the same case, no matter how long the diet is carried out.

Another very fair criticism that was made by Dr. White was in regard to the change in the order of the columns where the record for the day is kept from the order where the statistics are given. This change was made deliberately for the convenience of the general practitioner. He will more often consider only the caloric value of the food and not the number of grams of each ingredient. Consequently it will be more convenient for him to have this column come first, next to that stating the amount. It will mean very satisfactory progress in dietetic treatment, if we can get the general practitioner to pay attention even to the caloric value of the food. Furthermore, even where we wish to give consideration to the number of grams of each ingre-

dient of the food, in the first arrangement of the diet we do it by the total number of calories. For this purpose it is much more convenient to have this column come first. One quickly gets used to the arrangement, and confusion does not arise.

In regard to the relation of height and weight (spoken of by another gentleman), it is perfectly true, standard tables do not fit all individual cases. However, such tables are suitable for the average case. In the cases that most need regulation—the excessively fat and the excessively thin cases—we cannot take the actual weight as a basis for calculation. Should we do so, we should still more overnourish the fat man and still more undernourish the thin man. My table of height and weight is founded on one of the standard life insurance tables. As a matter of convenience in calculating, I have taken the nearest multiple of 5 for the figure for the weight. This gives results that are sufficiently accurate, for the daily allowance of calories need be determined only approximately.

ARTICLE XXXI.

REPORT OF WORK ACCOMPLISHED IN THE CONTROL OF TUBERCULOSIS IN MASSACHUSETTS DURING THE PAST YEAR.

By ARTHUR T. CABOT, M.D.
OF BOSTON.

READ JUNE 15, 1909.

REPORT OF WORK ACCOMPLISHED IN THE CONTROL OF TUBERCULOSIS IN MASSACHUSETTS DURING THE PAST YEAR.

When the Associated Committes were organized in 1905, there were but 23 anti-tuberculosis associations, dispensaries, etc., in Massachusetts. There are now 120 such organizations in the State, and of these 14 have been organized in the past year. Many of these organizations are very active and doing first-rate work. I regret to say that some of them are not so active. I look forward to a good deal of excellent work, however, when the State Hospitals, which will co-operate with the different clinics in the State, are started.

As evidence of appreciation of our work I have the gratifying announcement to make, that at the International Congress, held at Washington, a silver medal was awarded to the work done by this Association. The certificate reads: "A silver medal has been awarded to the State of Massachusetts for the exhibit of the excellent work it has done in the control of tuberculosis." The only State organization is the one which we represent here, and we have rather a handsome medal, which may properly be deposited in this Medical Library, attesting the approval of the International Congress of our work.

I wish to speak mainly of our plans for the future, because before our next meeting the three State Hospitals, which will probably be largely occupied by advanced cases, will be finished and in operation. It is evident that these hospitals, in order to do the best work, must act in hearty co-operation with these various anti-tuberculosis organizations throughout the State.

The Commission that is building these hospitals has already been of some assistance to the Associated Committees,

and has received aid from them. The co-operation between them must now be made much closer, and I wish to say a word of some of the ways in which the various anti-tuberculosis associations and the State Hospitals can help each other.

When the three hospitals now building are finished the Commission which is building them will also take over the Rutland Sanatorium, and will act as a Board of Trustees for all four of these hospitals.

The object of these State Hospitals is to take off of the hands of the local dispensaries those patients that cannot be properly cared for at home. It is evident that they can accommodate but a small proportion of the consumptives of the State, but by relieving the most difficult cases they will greatly lighten the burden of the local organizations.

It is manifestly of the greatest importance that in the transfer of cases from local organizations to hospitals, and in the return of those patients to the local organizations, the patients shall not be lost sight of. Heretofore, patients have been sent to Rutland, and then gone home as arrested cases, and in not a few instances those arrested cases have appeared again at some of the clinics with a fresh outbreak of the disease. We are very reasonably sure that some of these relapses can be prevented in the future by notifying the local organizations at the time that a patient is about to return home, so that they can be on the lookout for him and not let him go back and resume a faulty habit of living. We have already made a step in this direction, and the Commission, although not yet in charge of these hospitals, have made a number of lists of the local organizations in the State, and have sent them to the various hospitals,—to Rutland, Tewksbury, and to the various Insane Hospitals that have a considerable number of tuberculous patients,—with the request that the hospital authorities notify the local organization near the home of each patient about to return

home. It is quite evident that if this notification is to be kept up the authorities at the State Hospitals must see that their efforts in this direction bear fruit. It is the part of our committees and of the Associations under their charge to be ready to see to it that, when they get information of a patient, something is done about that patient, that, if possible, he has suitable work found for him, and if he was working before he went there at a reasonably healthy work that his place is secured for him again, if possible. It is well known that many patients can return to the very work which they were doing when taken sick, and if they sleep and live out of doors during the hours at home that they can work and still remain well. This is a thing which, it seems to me, the Association should take upon themselves, to follow these arrested cases, see that they come back to living under good conditions, that they sleep out of doors when possible, live out of doors, and in that way hold on to the good that they obtained at the Sanatorium.

Physicians who send patients to the hospitals should send with them proper histories, and if any tests for tuberculosis have been made and found positive that fact should be transmitted to the hospital authorities at the same time the patient is sent. It will be of great assistance to them to know at once facts which it might take them a long time to find out by examination.

In closing, I wish to say a word or two about the state our work is in.

The Hospital at North Reading will be finished this summer.

The Hospital at Lakeville will be ready for occupancy in the autumn, and the one at Westfield will be ready to open next spring, so that at the time of our next annual meeting they may all be expected to be working to their full capacity, and I ask for them your fullest support.

ARTICLE XXXII.

THE NECESSITY OF PROVIDING SUITABLE EMPLOYMENTS FOR TUBERCULOUS PATIENTS.

By ALFRED WORCESTER, M.D.
OF WALTHAM.

READ JUNE 15, 1909.

THE NECESSITY OF PROVIDING SUITABLE EMPLOYMENTS FOR TUBERCULOUS PATIENTS.

In the warfare civilization is now undertaking against tuberculosis we are hampered by various social and economic interests. Could we disregard these vexing factors and follow the single lead of sanitary science, our best line of attack would be far plainer. But this is impossible. And, instead, we find ourselves at every move forced to consider both its cost and the social objections thereto.

If, for instance, we could at once destroy all domestic animals found to be infected, and burn their barns, and then strictly quarantine all tuberculous patients as we do the lepers, doubtless the disease might within a generation or so become a rarity. Such radical measures are, of course, out of the question. The initial cost of such procedure, aside from its inhumanity, would be prohibitive. And yet, from the purely economic standpoint, at least partial quarantine measures are now demanded.

Except for our ignorance regarding the sources of infection, instead of the present uncertainty, there would be a far better agreement as to the kind of quarantine necessary. First we are told that the disease is contracted by the ingestion of the bacilli, in milk and meat. We, therefore, begin a vigorous crusade against tuberculous cattle. Then we are told that the cowless Japanese are peculiarly afflicted with the disease, and that the great expense of frequently decimating our herds is unnecessary. Accordingly our crusade along this line slows down.

Could we be as sure that the disease is communicated solely from one human creature to another as we are sure is the case, for instance, in leprosy, we should all agree to the desirability of as strictly quarantining our tuberculous patients as we do those suffering from scarlet fever, diphtheria or small pox. But even then, because of the long years patients suffer with the disease, and also because of their multitude, such strict quarantine both for social and economic reasons would be well nigh impossible.

We are thus forced to be content with only a partial quarantine. And even this is impeded both by its cost and also by the separation of families thus entailed. As regards this latter objection, which, by the way, is very serious and demands far more attention from the sociologists than it has yet received, it must now suffice to point out that were it not for the increasing and amply justified hopefulness regarding the curability of the disease in its initial stages, even a partial quarantine of those infected would be far more difficult of attainment than it is at present. Merely as a protective measure, however desirable for other members of the family and for the rest of the community, it would be far harder than it is to send tuberculous patients to a hospital. It is the hope of cure, or at least of an arrest of the disease, that makes it so comparatively easy to fill our sanatoriums and to assemble our tuberculosis classes. It is, therefore, most desirable that tuberculous patients shall not be divided into curables and incurables, even if such divisions were possible.

From the sanitary point of view the quarantine of the sanatorium regime is nearly ideal. And, doubtless, the education there received, lessens the menace of patients after their discharge, whatever their future history may be. But we know much more ought to be done than now is done by way of subsequent supervision of these discharged patients.

The tuberculosis camps and classes, too, in only lesser

degree, are of great sanitary service. Patients there are taught how to avoid infecting others. Could we make sure that all tuberculous patients are henceforth to be quarantined as strictly as in the sanatoriums, or even as in the tuberculosis classes, and subsequently to be carefully supervised until either dead or completely cured, then we might rightly feel that the battle against the disease has really begun. But, alas, how far we are from that! As yet we are only skirmishing. We have not yet ascertained the numerical strength of the enemy, nor his exact location. We have not even marshalled our own forces. We who are here assembled are only a partially organized general staff. Our function is to study with utmost thoroughness the opposing forces and then to work out the best plan of attack.

The special task assigned to me, upon which to-day I make this preliminary and very inadequate report, is the consideration of one of the great economic obstacles in the way of establishing a partial quarantine of all tuberculous patients. This obstacle is the interruption of their earning power. And the question before us is that of their proper employment in order that this loss may be minimized.

Great as is the cost of supporting these patients in their enforced idleness, the sacrifice of their earning power is at least an equal cost. This fact very naturally has not as yet received sufficient attention. For the cost of supporting the patients falls in large aggregates upon the public treasury or upon the anti-tuberculosis associations; whereas the loss of wages falls separately upon the individual families of the patients.

If in addition to this loss of earning power any part of the quarantine cost also falls upon the family, the burden already heavy may easily become unbearable. Is it any wonder that the infected bread-winner for the family postpones as long as possible going into quarantine? Indeed, so long as his earning power remains, is not such postponement of admitting his infection the bread-winner's duty?

Broadly stated, then, the obstacle we face is that the quarantine measures, which are of such advantage in protecting the community from the spread of the infection, may very likely overwhelm the patient's family with financial disaster. It is true that by such measures the family is relieved, at least in part, of the care of the patient. And in the advanced stages of the disease, where the patient is wholly incapacitated, this advantage is plain. In the incipient stages, too, where there is good hope of the patient's health being restored, there is, or at least there ought to be, a future economic advantage to the family. But this is greatly diminished by the difficulty such patients now have in finding employment after having been discharged from the sanatorium even as cured.

In spite of these qualifications the fact remains that the early acknowledgment of the infection causes a direct economic loss to the patient and to the patient's family. And yet our main hope in our struggles to stamp out the disease lies in just this early acknowledgment. We must, therefore, strive in every way to minimize this financial burden, which, while resting immediately upon the family, bears ultimately upon the community, not only financially, but even more importantly in preventing the early acknowledgment of the disease and the proper sanitary measures for its eradication. And any means that can be devised to save the earning power of tuberculous patients will thus be of immense public advantage.

The problem naturally divides into the two questions of employment for patients during their quarantine and after their discharge with their disease arrested. As regards the first question it may seem that it ought to be left to the authorities in charge of the sanatoriums and tuberculosis classes. They, of course, are best able to decide upon the therapeutic value, or disadvantage, of some occupation for their patients. But even if the lungs heal and the body

weight increases faster during the patient's absolute idleness, still greater advantages might result from the moderate employment of the patient's mind and muscles. If, for instance, patients might be taught some trade or art whereby, after their discharge, they might more easily earn their living and under more healthful conditions than obtained in their former occupations, or if during part of the day they might have opportunity to earn even small wages for the benefit of their families or for their own future support, who can doubt the moral and mental, to say nothing of the economic, advantage of such provision for them? Moreover, it is plain that the patient cannot fairly be considered fit to be discharged from the sanatorium as cured, and able again to earn his living, until his ability to work, as well as his lung power, has been tested. And if any effort is to be made to secure new and more healthful occupation for the patient after his discharge, the first steps thereto can far better be taken while he is under sanatorium supervision. In connection with every sanatorium there ought to be a trade and industrial school where patients according to their several abilities might have the chance to learn how in future to earn their livings under least harmful conditions. Even if only common school opportunities were there offered, and availed of, that, besides increasing their usefulness, would go far to offset the degradation of stagnation. Enforced idleness of mind and body may cure the man of his disease, and yet spoil the man.

The danger of such a result is, of course, much less in the tuberculosis class and camp than it is in the sanatorium, where the patient is wholly removed from all immediate knowledge of his family's needs. Such knowledge, it is true, and the consequent worriment over it, if not tempered by some provision for the family's relief, might interfere with the patient's recovery. Herein lies the great opportunity for the social worker, in devising means whereby the

patient's family may be helped until the wages previously depended upon can again be earned for them. This is a sanitary as well as a philanthropic necessity. For the family that has been exposed to infection surely ought not to be allowed to suffer for lack of most nourishing food while the bread-winner is being fattened in enforced idleness. If the patient be the mother of the family, the help of the social worker is even more necessary. Few families, at least without plentiful friendly assistance, can withstand the demoralization of the mother's absence.

If the patient himself can be given opportunity for earning even a small part of what his family needs, and especially if opportunity is provided whereby he can earn more and more as his recovery advances, there can be no doubt of the great therapeutic value of such incentive. From the economic standpoint, the advantage would be large; from the social point of view, it would be immense. It is, therefore, of highest importance that in all classes and camps, as well as in the sanatoriums, provision shall be made for the encouragement of every patient to undertake such employment of mind and body as will not retard his recovery. If, also, in this employment better ways of future earning may be acquired, so that his efficiency may increase rather than by idleness decrease, the patient can thus be given the best possible inducements to get well.

In some of the German sanatoriums patients are given such occupation, carefully graded according to their abilities. It is there recognized that it is too much to expect of the average man or woman to show much zeal in unremunerative labor, and they, therefore, pay patients for their work. These small earnings can either be sent directly to their families or retained as a credit to be paid the patients when discharged. Why cannot some such plan be tried in Massachusetts?

Let us now turn to the problem of proper employment

for patients in the incipient or arrested stages of the disease, who either have never entered, or who have been discharged from, sanatoriums and tuberculosis camps and clinics. Theoretically these two classes ought not, perhaps, to be considered together. For those who, under proper treatment, have had their disease arrested may, perhaps, be less likely to infect others than those who have never been taught how to take care of either themselves or others. But practically we may as well class them together, for in many cases the incipient disease can be as well arrested by a change of occupation as by a sojourn in the sanatorium.

We must consider the problem of the proper employment of such patients from two standpoints,—first, that of the individual, and, second, that of the public.

In the interest of the public it is plain that individuals whose disease may at any time break forth ought not to be employed where the disease, before even its outbreak should be recognized, might be communicated to others. For instance, it would probably be considered only a sensible precaution on the part of any family to refuse to employ as a cook or as a child-nurse a woman whose lungs either were or had been tuberculous. And we should all prefer not to have a tuberculous man, even on the chance of his having been cured, employed in handling our milk supply. The public interests thus plainly conflict with the interests of the individual who has, or who has had, or who is even suspected of having, tuberculosis. For, in the instances just cited, employment as a child-nurse or as a milk-handler might be ideal for the unfortunate individuals themselves. Where persons, in addition to their own afflictions, in the interests of others must suffer such restrictions, it is only fair that some compensating advantages shall be given them. Thus, both for the public's protection and also for the relief of the handicapped individuals, proper employments for them ought to be provided.

In devising such employments what requirements must be observed? 1st. The absolute safety of the public as regards the spread of the disease, (a) directly to fellow-workers, and (b) indirectly through the products of the infected laborers. 2d. The minimum interference by the fostered industries with the earning power of other workers in the same occupations. 3d. (a) The most healthful environment for the affected workers, and (b) the least danger to them of overtaxing their strength. Here, then, we have our problem reduced to its simplest terms. What kinds of employment will best meet these reqirements?

Inasmuch as all agree upon the necessity of outdoor life in curing tuberculous patients of their disease, or in arresting it, there would at first sight seem to be no question of the subsequent advantage to them of outdoor employments. And in more equable climates, where outdoor workers are not subjected to extremes of heat and cold, to say nothing of drenching storms, such employments would, of course, have precedence. But in our climate these vicissitudes of weather considerably lessen the advantages of outdoor work. It is one thing to recline outdoors wrapped in fur during the winter, or under the protection of shack roofs during the summer's scorching sun or storms of rain, and it is quite another thing to be working outside every day of the year in all kinds of weather. Moreover, those who all their lives have been used to indoor trades, and whose abilities lie wholly in such direction, find it almost impossible to become farmers and gardeners. This difficulty has been found to be so great by the national Jewish society for the relief of tuberculous patients that they have had to report the failure of their outdoor colony in Colorado, and now they are trying instead to provide for their patients opportunities to learn the electrician's and other mechanical trades in most favorable hygienic shops. They report their inability to turn the Jews into agriculturists. In Germany,

on the other hand, the farming colonies seem to prosper. This, doubtless, is because of the Germans' greater love for such work, as is evidenced by the thousands of garden patches in the suburbs, where the city workers spend their scanty leisure hours.

Racial prejudices against ordinary farming and gardening and stock raising may not be conquerable; but there are many other profitable occupations for country dwellers, wherein, too, the disadvantage of climatic changes can be largely obviated. Thus more and more gardening is being done under glass. And then there is the great industry of poultry raising. There is no danger of glutting the market with eggs or squabs. This is an especially good chance for women. Forestry also offers good chances. But perhaps the best chance of all in this State can now be found in the crusade against the gypsy moths. What better employment could possibly be devised for a man seeking insurance against the return of his tuberculosis than in creosoting the nests of this modern pest that now threatens the existence of our forests!

Such occupations as these fulfil all of the specified requirements. But, as already has been intimated, it is also necessary to select other occupations for those who have always worked in shops, and who either are disabled from other and more active employments, or who cannot be induced to move their families out of the cities into the more healthful country. For them opportunities must be provided where they can work in hygienic shops in an atmosphere free from dust and rich in oxygen. Such desirable conditions possibly cannot be secured in the large shops and factories. In them there would be the disadvantage, also, of intimate association with fellow-workmen, and the consequent danger, real or imaginary, of infecting them. There would also be the added disadvantage of obliging the somewhat handicapped workman to compete with his

stronger fellows. These disadvantages would not be met in small handicraft shops, which now promise a most desirable revival of arts and trades that have been almost lost.

It now remains for us to consider the steps necessary to secure for men and women whose tubercular disease has been arrested such employments as have been here outlined. In the first place, every patient who is registered as tuberculous, irrespective of what quarantine he undergoes, should have his social and economic status studied as carefully as his physical signs. If it be found that his disease has not been caused nor fomented by the conditions of his former employment, and if it be further found that there is practically no danger to his fellow-workmen or indirectly to others by the possible infection of the products of his labor, then every effort must be made to secure his return to his former occupation. In this effort a mountain of prejudice will be encountered. For, where people are taught the real dangers of tubercular infection, it seems unavoidable that there shall simultaneously arise an unreasonable fear of those who have ever had the disease. So cruel is this effect of our tuberculosis exhibits and popular lectures on the subject that one might well be forgiven for preferring the bliss of ignorance. We physicians must, therefore, be ever mindful of our double duty,—that while teaching the laity the dangers of tubercular infection we must no less vigorously assure them of what not to fear.

There can be no doubt that by far the larger proportion of employments are perfectly safe for the patients whose disease has been arrested, both for themselves and for others. It is our duty to persuade their former employers and fellow-workmen of this fact. But for the child-nurse and the bread-baker, the factory girl and the cigar maker, the milk handler and the general housework girl, and for all others in whose occupations danger lies either for themselves or, in case of further outbreaks of the disease, to others, other forms of employment must be provided.

Upon whom does this duty rest, or, in other words, by whom can it best be done? Plainly, in this search for proper employments, the physician's service is indispensable. But it is unfair that the whole burden should rest upon the medical profession. Nor can such an enormous task be delegated to any small commission with any expectation of a few being able to meet such multifarious needs. It will never be advisable to arrange for the concentration of such aided individuals in large shops and industries, however hygienic such might be and however wisely supervised. We must always remember that the family, and not the individual, is the real unit of the community, and that it is neither practicable nor wise to require the unnecessary removal of families, and far less so to aid and abet their separation.

The problem, then, although so general, is nevertheless a distinctly local problem, and so can best be solved by those who are in closest touch with the patients themselves and their families. The anti-tuberculosis societies would seem to be the best fitted agents to undertake the task. Composed as they are of social workers and physicians, they are far the most likely to succeed. It is not enough for such societies, as some now seem to think, to send patients off to sanatoriums and hospitals. It is also their duty to search out all possible ways of aiding their embarrassed families, and then, after the patients' return with the disease arrested, it becomes their duty to secure for them proper employment. In return for this service to them it will be easy to secure their assent to the supervision that is so desirable. And in this way many of the unfortunate relapses that now occur might be prevented. Here, then, we have another reason for securing as soon as possible the organization of an anti-tuberculosis association in every city and town and village. And in order that their work in this, as in every other, line shall be most effective such associations must be brought into coöperation.

DISCUSSION.

Dr. J. H. Pratt, of Boston: I shall deal only with one aspect of the subject that Dr. Worcester has presented so interestingly, and that is the employment of the arrested cases. Personally, I think that the employment of patients with tuberculosis is something that must be carefully studied before we permit it to any extent. It is a very difficult question. Patients with acute disease cannot work. In the end we find it better for their families if these patients are given the rest treatment until the disease is arrested. While a patient has tuberculosis in an active stage, he can do very little work without jeopardizing his chance of recovery. The amount of money he can earn is slight while he has tubercle bacilli in his sputum. If he is given employment outside of a sanatorium, he may infect his neighbors. During the past 14 years I have been interested in this work in connection with our tuberculosis classes, and our patients are all from the laboring classes, referred to us from dispensaries and the Mass. General Hospital, and they have to work with their hands, and that means hard physical labor. Not one of my patients has been a brain worker. It has been a very difficult matter to secure work for some of these patients, but I am glad to be able to say that all of our graduates with the disease arrested are working to-day with one exception, or I should say all are working who have remained well. Now, 35 have been discharged from the class with the disease arrested, and those 35 patients are all well to-day. Out of those, two have been re-admitted to the class, and one of them is almost ready to take up his work again. Many of these patients have been aided to find work. In the majority of instances they have found work themselves. As Dr. Cabot pointed out, we have found that it is possible for these patients to return to their former employment. A considerable percentage of these arrested cases of tuberculosis are now working indoors, and with scarcely any exceptions they have returned to their former employment. They can earn better wages, and it really makes less demands upon the nervous system.

If the patient is working under distinctly mental tension, that would be impossible. We had one such case, but he left the class before the disease was arrested, and I understand he died the following year.

To give an idea as to the work these patients are doing, two are painters, several are laborers, one is a clerk in a jewelry store and obliged to work 12 hours a day, and the women are nearly all doing housework. Seventy per cent. of the patients we have sent back to work have remained well. Two of the graduates have been working now for more than three years, and thirteen have been working two years, and three for over a year and a half. One of them worked from 7 A.M. to 9 P.M. five days in the week, and on Saturday from 7 to 12. He has shown no symptoms of the disease in 7 months. A painter, after being examined, was found to have tubercle bacilli in his sputum. He was treated, and remained well for three years. During the past year and a half he had insufficient nourishment, and had a relapse. He returned for treatment, and the disease has been arrested so that he is now able to resume his work. We have had some advanced cases among those treated.

DR. HERBERT J. HALL, of Marblehead: I do not pretend to know from experience the effect of especial employments upon tuberculous patients. But if it is decided that employment under especial conditions is advisable, then the experience we have had at Marblehead in the employment of nervously handicapped people may be of value. Some of you may know that during the past five years we have maintained an institution where neurasthenic patients are given manual work to do, and that the plan not only helps to restore health, but represents fair remuneration. My experience allows me to suggest, rather vaguely, that the manufacture of artistic tiles from clay might prove practicable for convalescent tuberculosis patients, provided the designs were made by fully qualified designers and the execution, which may be made largely mechanical, could be directed by a competent craftsman. Even the limited strength of invalids, if carefully and intelligently directed, may produce articles of great value and in sufficient quantity to pay.

Dr. Cleaveland Floyd, of Brookline: I think one point should have special emphasis. It makes not so much difference what the occupation is that the patient takes up after his case has been arrested, unless it be one of the trades where there is dust and dirt, if he remains under observation for months and years after arrest has taken place. If patients come back to report every little while relapse is very much less liable to take place than when the patient has been turned loose and does not report for years or until relapse has taken place. Many patients do well in trades where they have been before, but prolonged oversight is necessary.

Dr. Frederick L. Hills, of Rutland: When the disease has been arrested, I think it is very important to urge the patients to do some kind of work. At Rutland we expect all patients to do a certain amount of work daily, and we give them a certain amount of remuneration, in that we remit the board. All who are able to, work about half a day for their board. In addition to that we have about 130 patients who are working from one and a half to two hours daily. Work is given to them as soon as the absence of activity of their disease is evident, and we consider them in a condition to be benefited by a certain amount of work. After they are discharged, one of the most difficult things is to find them suitable employment. Many of them are working half of the day before they return home, so that they are able to take up their occupation without breaking down when they return to work. We try to have them keep up the treatment and sleep out of doors at night. I think the night camp is a very excellent thing, and it will be a great aid in the future for the relief of the situation. It is proposed to have a night camp established here in Boston, and we are hoping to send some of our graduates to that camp. I think that it is something that should be developed in other cities. Since the first of April we have been notifying the local societies or the associated committees in the various towns and cities of the State upon the discharge of a patient, and asking them to supervise them as suggested by Dr. Cabot. We have had a number of replies from physicians and other health officers in the State, telling us that they are looking after these patients.

Dr. E. O. Otis, of Boston: I would like to call the attention of the gentlemen to the *night camp* which the Boston Tuberculosis Association has now under construction, under charge of Dr. J. J. Minot, the chairman of the committee. This camp is situated in Mattapan, upon a tract of land presented to the Association by Mr. Prendergast of Boston. Our plan is to afford an opportunity for arrested cases, discharged from Rutland, to sleep under practically open-air conditions. While working during the day in the city they come to the camp after their day's work is done, receive a nourishing meal, spend the evening in fresh air, and sleep in an open "lean to," have a good breakfast, and then go into the city for their day's work. In this way it is hoped that many relapses will be averted. During the day, when the men are away, the camp is to be used for the children who were at the open-air school during the school year—children who have early closed tuberculosis. The camp will soon be ready, and in behalf of the Association, I cordially invite all interested in the new departure to visit it.

Dr. I. J. Clarke, of Haverhill: It seems to me that if all the physicians throughout the state would make special effort to place these arrested cases in the occupation of chauffeur that it would be very desirable for them. I have been able to place two or three cases to very good advantage in places where physicians or their friends have automobiles.

Dr. A. N. Blodgett, of Boston: I have been hoping that some plan might be thought of that would be of use for cases such as have been discussed, those with incipient disease or those discharged from sanatoriums as being "arrested." Many people who travel on the Continent engage the services of a courier, a not very laborious and a healthful occupation. The couriers make all arrangements for the comfort of their employers, and incidentally for the comfort and convenience of the courier as well.

This same arrangement is gradually being developed in our Maine forests, where to my personal knowledge many persons employ guides in their excursions for hunting and

fishing, entire families taking guides to some of the remoter parts of the Maine woods, where they enjoy seclusion from the crowds at the more frequented resorts. This employment would seem an ideal occupation for "arrested" cases of tuberculosis, combining every essential element for their treatment, and would also be moderately remunerative in money—a very desirable consideration.

ARTICLE XXXIII.

A PROGRAM FOR TUBERCULOSIS SOCIETIES IN SMALLER CITIES AND TOWNS.

By CARL A. ALLEN, M.D.
OF HOLYOKE.

READ JUNE 15, 1909.

A PROGRAM FOR TUBERCULOSIS SOCIETIES IN SMALLER CITIES AND TOWNS.

MANY of the smaller cities, as well as larger towns, are organizing anti-tuberculosis societies in response to the general awakening of the public and the increased interest of the medical profession in the disease and the possibility of its prevention and cure.

The object of this paper is to place before the medical profession in Massachusetts a general plan of organization and a practical working scheme which has been found valuable in actual practice in several of our cities and towns.

Inquiries are coming to us nearly every week from widely different sections, asking advice as to methods of organization and the expense attending the formation of tuberculosis clinics, classes, and day camps.

The following general plan will be found satisfactory:

ORGANIZATION.

Get together a few interested persons, with as many physicians among the number as possible; also business men, ladies prominent in social and charitable work, the Young Men's Christian Association, clergy, and others interested, and organize.

Copies of a constitution and by-laws can be procured from any of the existing societies, that can be modified to suit individual needs.

Every organization should have one Central Board of Directors or Executive Council, who should have full control of the work.

Let them appoint a few essential Committees, somewhat as follows:—

1. On Education and Publication.
2. Finance.
3. Laws and Ordinances.
4. Hospitals and Day Camps.
5. Membership.
6. Statistics.
7. Tenement and Mill Inspection.
8. Relief.

These and other committees should be appointed according to the location, character, and need of the community. It would seem wise to have the chairmen of all committees members of the Central Board, and let them appoint the other members from outside, so as to interest as many public-spirited citizens as possible. The committees should report to the Central Board at stated intervals, giving full detail of all work done or attempted. As soon as the Society is fully organized, hold a general public mass meeting. See the editors of all local papers, and get their assistance in advertising the meeting and its object.

The daily press everywhere has been of untold assistance in helping the work along, and has always been ready and willing to lend its columns for the good of the cause.

Have some man of prominence in the work as the principal speaker, and invite all physicians, nurses, teachers, charitable and fraternal orders to attend, besides the general public. Following such a meeting, have the Tuberculosis Exhibit of the Boston Association for a week, if possible. The mass meeting, exhibit, and free newspaper advertising will thoroughly awaken the community, and the work of the various committees will be greatly enhanced thereby.

Education is the keynote of the work of the first months of any tuberculosis organization. My own experience

teaches me that, while we can save a few of those now afflicted with tuberculosis, our hope must be largely in teaching the children of the next generation so to live that they may escape the disease themselves or prevent giving it to others.

Very successful work has been done along this line in several of our cities by giving short lectures to the teachers in all the schools and distributing among the pupils suitable cards for hanging in their rooms, bearing brief sentences telling what to do and what not to do to keep well.

In Holyoke, the Educational Committee gave prizes for the best compositions on how to prevent tuberculosis, all the pupils of the three higher grades in the grammar schools participating. Much good work has also been done by lectures, with and without lantern slide illustration, before fraternal and charitable orders, mothers' clubs, in churches, etc. The Educational Committes are constantly distributing literature concerning the cause, prevention, and cure of tuberculosis; posting copies of anti-spitting laws on the streets, in public halls, schools, theatres, etc., and contributing notices and articles to the daily press.

Dr. Rogers, of Yonkers, N. Y., considers lantern shows in public parks, using suitable pictures to interest the public, interspersed with slides containing pithy epigrams concerning the cause, prevention, and cure of tuberculosis, to be one of the most effective means of educating the public.

TUBERCULOSIS CLASSES.

Class work, as formulated by Dr. Joseph H. Pratt of Boston, and fully illustrated before this society, has been found equally successful in other places. But little expense need be incurred in forming such a class, and physicians can always be found who are ready to give their services, and a suitable meeting place should not be difficult to obtain. If there is a hospital in the place, a room can

generally be obtained free, as at Salem in the out-patient department, or at a nominal rental, as in Holyoke and Springfield. Classes generally meet once a week, and each patient is taught to take their temperature and pulse twice a day, and to keep a daily record of their manner of life, symptoms, diet, exercise, care of sputa, etc.

Advice is given to each personally, their weight taken, and cheer and courage promoted. Each patient thus becomes a living illustration of the modern means found best adapted to prevent and cure the disease.

In both Springfield and Holyoke classes have been formed for men and women separately, each class meeting once a week. In Holyoke the classes are held every Monday and Wednesday from 3 to 4 P.M., followed by a clinic from 4 to 5 P.M.

VISITING NURSES.

To make the work of the class successful there should be a visiting nurse to visit the patients each week in their homes, teaching them how to live so as to get the greatest possible amount of fresh air both day and night, how to care for their sputa, the need of scrupulous cleanliness, daily baths, care of teeth and hands, how to keep a daily record of pulse and temperatnre, when to take exercise, etc. The nurse should report her work and the number of calls made each week to the supervising physician. Salem pays such a nurse $600.00 per year, and she gives all her time. Besides visiting the patients, she reports suitable cases to the Associated Charities, has patients examined for Rutland, enlists coöperation of the Board of Health in needy cases, etc. Fitchburg and Springfield pay $75 and $65, respectively, per month for the same line of work.

In Holyoke, our Secretary is a trained nurse, and gives half her time for $300 per year. She also searches out new cases and reports them to the Board of Health, and gives special attention to the children in tuberculous families,

finding some in all stages of the disease. The District Nurse Association has assisted in many of the advanced cases, where nursing was imperatively needed, rendering most efficient aid.

CLINICS.

It is always difficult to get hold of new cases in the early or curable stage, and the forming of a free clinic for examination and advice has been found a decided aid in many cases.

In Fitchburg a clinic was opened last March. The rent of a suitable room was given and a pair of scales. The other fittings cost $45. The cost of running the clinic was practically $2.00 a week. 37 patients were treated the first seven weeks. In Salem the cost was only $8.00 last year with 57 patients in attendance.

In Holyoke a free clinic was opened last January. The same rooms were used as for the Class, the visiting nurse being in attendance and the work of the clinic being divided among three of our local physicians. The only extra expense was for the few medicines furnished. Forty-five patients have been in attendance.

DAY CAMPS.

While the clinic will bring you in touch with many new cases, the Day Camp is a local Sanatarium, applicable to any community or location, and aside from its value to the patients themselves it is one of the best methods of practically illustrating to the public at large, how to prevent and cure consumption. To procure a suitable location for a Day Camp is sometimes a difficult problem. It should be at a considerable elevation, with good water, plenty of shade, not too far from the centre of population, and easily accesssible by the local car line. There should be at least one frame building of two or three rooms and several tents for rest and shelter in cold or stormy weather. The dining

room may be on a wide piazza of the main building or in a large tent, and reclining chairs and hammocks must be furnished for the patients. The general management of the Day Camps is about as follows:

The Matron of the Camp should be a trained nurse and capable of supervising the cooking as well, and she will need such assistance in the kitchen as the size of the Camp demands. The rules of the Camp should be few and simple, relating chiefly to the care of the sputa, good behavior, punctual attendance and personal cleanliness.

In general the patients arrive at the Camp about 9 A.M. They are given a lunch of bread, milk and eggs, and are placed in comfortable positions in reclining chairs. Records of pulse, temperature and general condition are taken two or three times during the day. A good nourishing meal of meat or fish, with two vegetables and a suitable dessert is furnished at noon.

A temperature much above 99° requires absolute rest in the reclining position, but games and amusements suitable for individual cases are allowed. Another lunch or an egg nog is given before the patient's departure late in the afternoon.

In Springfield and Holyoke, several patients were allowed to remain over night, some furnishing their own tents, others being supplied by the society.

Some of the patients, where the disease is in the incipient stage, will be able and willing to render much assistance as caretakers of the Camp, thus saving some expense. The cost of establishing a Camp will vary greatly. In Salem, the initial cost was $260.00, the equipment being one large and four small tents. The entire cost for four months was $665.00. A three room portable house is to be added this year.

In Springfield the equipment cost $431.00, including a portable house (which was donated), four tents and other camp necessities. The entire cost of the Camp and main-

tenance for five months was about $1300.00, or 70 cts. per patient per day. The paid attendants were a trained nurse who supervised the cooking, a woman to assist in the kitchen and a man to care for the sanitaries.

In Holyoke, a two room building with a wide piazza for a dining room was erected, and three tents procured at an initial cost of $280.00. Most of the furnishings were donated. The entire cost of building, tents, rent and maintenance for five months was $1057.00. There was no paid attendant except the supervising matron and nurse. Cost per patient per day was 54 cents.

FINANCES.

The cost of maintaining an active anti-tuberculosis organization is considerable, but thus far very little trouble has been found in procuring needed funds.

Besides membership fees and voluntary contributions, funds have been secured in various ways. Churches, fraternal organizations and charitable societies have contributed generously. In Holyoke the ladies raised $200 from a musical concert, $326 from two food sales, $206 from a whist party, and about $225 from the sale of Red Cross stamps. Two games of base ball netted us nearly $500.

Springfield secured $235 from a benefit whist party, $436 from base ball games, and nearly $600 from the sale of Red Cross stamps. Fitchburg raised $1000 from Red Cross stamp sales and generous sums from a garden party and Carnation Day. Salem won the prize by making Carnation Day a grand success, selling carnations in such quantities at 10 cts. each as to net the Society $2400.

Time would fail me to mention in detail all the work of the various committees, but carefully compiled statistics showing the number of deaths from tuberculosis during a series of years, with the streets and houses in which the deaths have occurred, as well as the occupations having the

highest mortality, are very effective in bringing home to the people, and especially the city government, the facts about the disease. Tuberculosis is a house disease, and certain streets and tenements will always be found showing a much greater number of deaths than others, and the imperative necessity of complete renovation and fumigation after death or removal. This committee should also keep track of all migratory cases as far as possible.

The committee on Laws and Ordinances will find plenty of work to do in securing a reasonable enforcement of the present registration laws, the anti-spitting law, and all ordinances relating to municipal as well as individual cleanliness, pure air and drinking water, and especially a milk supply from healthy cows and clean dairies.

I do not think dispensaries are really essential except in large cities. Wherever anti-tuberculosis societies exist, physicians are in hearty sympathy with the movement as a rule, and practically no opposition has been shown. Indifference on the part of a few, and more or less negligence in reporting cases to the Board of Health, are the chief faults.

In closing, let me urge my brother practitioners, in cities and towns not already having a society, to take the initiative at once and organize an anti-tuberculosis association.

To assist in lowering the death rate in the *immediate* future, and to place the greatest scourge the human race has ever known in all time and in all ages, in the same category as small pox, is surely an object as worthy as civic betterment, municipal reform, church federation and universal peace among the nations.

DISCUSSION.

Dr. E. O. Otis, of Boston: I am very sure Dr. Allen is mistaken when he says that the expense of the exhibit is about $300. I am under the impression that the expense

is about $100. The aim of the Boston Tuberculosis Association is to make it as useful as possible, and only the actual expense of putting it into the different towns is considered. There is no intention of making any profit. I think Dr. Allen is mistaken about this.

Dr. ALLEN: Of course I included in that statement the rent of halls, and the other expenses that would come from the Society. I think it cost us $200 to get the hall. The $300 covered the entire expense.

Dr. E. A. DARLING, of Cambridge: I regret that I was unable to be here to hear the paper. I can only say a little about the Cambridge organization. Our Association started in six years ago without any definite plan. We worked up the plans as we went along, and the Association has developed along lines which were entirely unforeseen at the beginning. The educational work has been similar to that carried on by the Boston Society. We have aroused interest in the subject by giving talks before clubs, boards of trade, the Cambridge Club, church clubs, labor unions, in factories; in short, wherever we could get a hearing. We have had a large uumber of such meetings, and as a result there is a much better understanding of the problem by the public at large.

The most important work is that connected with the incipient cases. We begin by investigating every case of tuberculosis reported in the city. We have found it necessary to employ a trained social worker for this purpose, and now have two women who give practically all their time to the study of cases. If the case is an incipient one, a case for Rutland, we arrange to have the examination made. If the patient should go to Rutland we try to raise the money, and it is astonishing what results have followed from this plan. There is no patient so poor but that funds may be found for him, often from associations or the church to which the patient may belong, from friends, from former employers, or from members of the family. The more advanced cases are now cared for by the Board of Health, in the day camp and hospital. In some instances the more advanced cases are cared for at home by the nurses of the visiting Nurses' Association. They are visited from time

to time to see that they are being cared for. We are striving to have the other members of families where tuberculosis is found, examined. We have established a children's clinic, at which more than 500 children have been examined. Many have been found diseased, not with tuberculosis wholly, but with adenoids, diseased tonsils, etc.

The financial question in the small cities seems to me a very important one. The question of raising money has bothered us from the very start. We depend upon voluntary contributions. We have sent out letters of appeal, and until the present year this method has been sufficient to raise enough money to carry on the necessary work. The expenses have been high. We have to pay rent for the rooms, which are used as office and dispensary. We have to pay half the salary of the nurse we employ, the remainder being paid by the Nurses' Association. Since the first of October the expenses have already been about $2500, and in former years our total annual expenses were about that. This is quite a sum to raise by small subscriptions, and yet we do not see any other way of obtaining funds. We have had some assistance from concerts, but this has not played a very important part. This is the problem that is confronting us now, but we cannot carry on the work without additional funds. We try to interest manufacturers with regard to the class of people they employ, but they do not seem to see it in the right light. I do not know how much I have repeated the substance of Dr. Allen's paper. I am very sorry not to have been able to listen to it.

Dr. Henry Dearing, of Braintree: I want to say a word or two regarding the experience I have had in Braintree the past year. I believe that Boards of Health have a great deal to do with carrying on this work, and it is to them that townspeople look for help and aid. I believe they have it in their power to do a great deal of good in investigating these cases and in establishing day camps, an extremely important matter. Within the past three months we have been able, with the help of the Braintree Board of Health, which happens to be constituted of three physicians in our community, to establish a day camp. At present we have three patients under canvas. Food is furnished for the patients by the Overseers of the Poor, and we, as a

Health Board, pay for the nursing. We hope to form an anti-tuberculosis society in the near future.

There is one thing I wish to mention just now, because it has appealed to me for at least the last ten years, while having the care of a good many men under canvas. I think we readily find that there is a difference between sleeping indoors, in the shack, or sleeping in tents. It has been my experience that where men have slept in tents they have always taken care of themselves. The health of the men is almost always good. Those who have lived under canvas for two or three weeks during the year have found it very beneficial. When a man has been put into a shack, just as soon as we are able to get him out of that shack we put him into a tent. We have one such patient now, and he is making a splendid record, and I hope to report, very soon, his return to perfect health. I speak of these things as having observed good results in my experience, and I heartily endorse sleeping under canvas at night.

ARTICLE XXXIV.

THE DIAGNOSIS OF PHTHISIS, AND ITS ASSOCIATION WITH CERTAIN SIMULATING DISEASES.

By

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THE DIAGNOSIS OF PHTHISIS, AND ITS ASSOTION WITH CERTAIN SIMULATING DISEASES.

1.—Certain frequently neglected points in the diagnosis of Phthisis.

THE diagnosis of phthisis in its incipiency presents to the great body of medical men one of the most difficult problems. No disease is so multiform in its manifestations or so often obscured or simulated by other diseases. Aside from these facts the location and the depth of beginning pulmonary involvement are of great importance in determining the ease with which a diagnosis can be made. The small lobule of tuberculous tissue is almost impossible of detection on account of its minute size, and even where several have coalesced, compensatory emphysema precludes detection. Again, where the primary area of consolidation occurs in those parts of the lung away from the surface, normal lung tissue coming between the diseased area and the ear will exclude all transmission of abnormal adventitious sounds. In such cases phthisis may not be suspected until routine sputum examination shows tubercle bacilli to be present. Furthermore, in those cases whose pulmonary expansion is limited and areas of atelectasis are constantly present at the margins of the lung, this condition may obscure a small area of caseous broncho pneumonia in this location. The phthisical patient, by the very reason of his general physical condition, is more prone to develop complicating diseases, and asthma, chronic bronchitis or nephritis, add one more element of difficulty in the way of the early detection of phthisis.

For this and many other reasons an early diagnosis of pulmonary tuberculosis consists of a summary of all factors obtainable as indicative of its presence. Far too many physicians neglect to treat a patient for phthisis until they have proved its presence in the individual. Treatment may with advantage be instituted while the suspicion of phthisis is being proved a certainty.

The onset of phthisis is varied, and often ushered in by some complicating disease whose presence apparently accounts for all symptoms. Bronchitis, laryngitis, or marked debility are often the beginnings of phthisis, and their signs or symptoms may be all that are obtainable for weeks or months. Nevertheless, their association with pulmonary tuberculosis is generally appreciated, and the accompanying lung condition, therefore, closely scrutinized. Hemoptysis is of immense diagnostic significance even in the absence of pulmonary signs, and while it may not necessarily arise from tuberculosis its occurrence is always suggestive of tubercle formations in the lungs. Not infrequently phthisis first produces marked constitutional symptoms by gastric upset. Stomach cough is a well-known expression. The dyspepsia of latent or incipient disease frequently shows itself as mere functional inactivity or as hyperchlorhydria. So noticeably frequent is the association of gastric symptoms with phthisis that a routine pulmonary examination is now being made in most cases of apparently simple indigestion in at least one of our large out-patient clinics. It is well known that the best soil for the growth of the tubercle is the tissue of the lung. The presence, therefore, of adenitis or pleurisy with or without effusion, where the tubercle bacillus is the probable etiological factor, should always direct attention to the lungs themselves. Many cases of tubercular adenitis show signs of diminished areation at the apex of one lung, and frequently this may be the beginning of an active process from glandular involvement of long stand-

ing. Pleurisy with effusion is known to be tubercular in the great majority of instances, and a study of the final results in such cases shows the development of phthisis in by far the larger number. These two diseases, when present, may be taken as an index of the patient's resistance to the tubercle bacillus, aud generally mean a lack of or a considerably lowered natural resistance to the organism.

Such symptoms of phthisis as cough, expectoration, loss of strength and weight, and night sweats, need no emphasis, but the presence of a number of other less evident symptoms are often of great significance.

The body temperature is among the most valuable of these. It is undoubtedly true that occasionally incipient tuberculosis may show a subnormal temperature, but in the large proportion of cases of developing phthisis fever is present. A marked elevation is not generally noticeable, but the occurrence of a temperature running between 99 and 99.6° in the late afternoon is of real import. Oversight of such cases, where no evidence of tuberculosis is present for a number of weeks, will rarely fail to show signs of pulmonary disease sooner or later.

Frequently a febrile reaction may be brought out in incipient phthisis following exertion which is unassociated with fatigue. This is in all probability due to autoinoculation through the absorption of the toxins produced by tubercle growth. Many a case of suspected phthisis will, on reporting at a clinic for examination, show a slight morning temperature, either from excitement or exertion. The home record of the case reveals no elevation whatever. This is especially true in children. Not only is this symptom of value in diagnosis, but also in prognosis, for when under treatment no febrile reaction occurs even on exertion, immunization against the toxin of tubercle is being built up or the process in the body is to a considerable degree arrested.

Pulse. — Hand in hand with elevated temperature occurs the accelerated pulse. In many instances, even where toxic absorption is not sufficient to produce a febrile reaction, it may yet markedly affect the pulse rate. A low tension, running pulse is not so characteristic of the incipient case as where the disease has existed for some time. Nevertheless, when low tension and acceleration of pulse are present, a phthisical lesion may explain this condition, which might otherwise be attributed to neurasthenia.

Sputum. — The great value of sputum examination is in diagnosis. The prognostic significance of the presence of a large or small number of tubercle bacilli has been greatly exaggerated, and little value can be placed upon it. The occurrence of bacilli in the sputum of consumptive patients shows great variation. Nagel, in 1081 cases of phthisis, found the tubercle bacilli in about 15%, and of those only $\frac{1}{4}$% were in the incipient stage.

The diagnosis, therefore, of most cases must be made before the sputum is positive. In a considerable number of instances, if the whole sputum were examined, the percentage of positive cases would be materially increased. With the disintegration of the sputum by means of sodic hydrate and the use of the centrifugalized sediment, a far larger number of tubercle bacilli might be demonstrated on first examination.

Physical Signs. — Among the physical signs of pulmonary tuberculosis that are frequently neglected in diagnosis, is that of expansion of the base of the lungs. In many instances when there is an active lesion at the apex, the expansion of the base of the lung on the same side will be markedly limited as compared with the other. This has been especially emphasized by Williams in the use of the X-ray in the diagnosis of phthisis. Frequently in the suspected case an initial examination of the base of the lungs will, through the limitation of expansion on one side, give

good evidence as to the location of the lesion. As the process becomes quiescent or well marked, so that the capacity of the lung is taxed, this phenomenon may disappear. In the incipient case, however, it is fairly constant. Corresponding to the expansion of the lower lung border on inspiration, as demonstrated by the X-ray, percussion, or the observation of Litten's phenomenon, is the expansion of the apices. In the percussion of the apical outline in the normal chest, unless forcible inspiration is used, the full width of the lung apex is rarely obtained. Inflation of the lung tissue in this region, even before the isthmus of lung resonance across the shoulder is narrowed, may show expansion to be markedly retarded in this region, even on forced inspiration. In those cases also where one apex is involved, and full expansion of the lung fails to give a widing girdle of pulmonary resonance on the opposite side, that apex should be viewed with suspicion. This sign may be of value in deciding between atelectasis and consolidation in many instances. In the very earliest cases, before the percussion note shows any change, the limitation of apical expansion, taken together with the loss of Litten's sign on the same side, may localize a beginning lesion. Aside from the limitation of the lung movement at the apices, the narrowing of the width of pulmonary resonance across the summit of the lung occurs in early apical involvement. The normal area of resonance measures $3\frac{1}{2}$-$4\frac{3}{4}$ cc. in width. When phthisis exists this may be materially decreased, so that the area of resonance may measure $\frac{3}{4}$ to 1cc. in diameter. Before contraction of the lung tissues has occurred, due to the coalescence of tubercles, this sign may be absent, but as coalescence and retraction occur early, the shrinking of the apical outline is of value in detecting beginning apical disease.

In the use of percussion in the diagnosis of phthisis, not only the character of the sound elicited is of importance, but also the flexibility of the underlying tissues. The sense

of resistance obtained by the pleximeter finger over consolidation is in marked contrast to the elasticity of the normal lung. This varies from a slight loss of elasticity over an area of lung consolidation to the board-like resistance over fluid or plastic pleurisy.

Waller, in discussing the methods used in applying percussion, strongly urges the use of the vertical asymmetrical method. He says, and with good reason, that by constantly comparing the note obtained while percussing two sides of the chest, the fact that both may be abnormal is often overlooked. By examining the lungs from above downward, however, the change of the note obtained gives a far more accurate conception of the presence or absence of dullness.

Fluoroscopic examination of the lung generally shows that the evidences of infiltration are well below the extent made out by percussion. That a more correct idea of the real extent of consolidation can be obtained by vertical percussion, there is little doubt. In most instances where one apex is involved to any appreciable degree, careful examination will almost invariably show impaired resonance on the opposite side, but this can only be obtained with certainty when the method of Waller is used.

The change of position of the patient in the examination of the lungs, as is done in the examination of the heart, may occasionally give us one more aid in diagnosis. Postural dullness, due, according to Albert Abrams, to the gravitation of blood to the dependent portion of the lungs, occurs constantly in health, most marked, perhaps, in children. The uppermost portion of the chest in the prone position however, normally shows hyperresonance.

In phthisis variations from the normal by means of percussion may be brought out by having that portion of the lung which is suspected uppermost, and a lack of hyperresonance may be of real importance.

The use of tuberculin as a diagnostic means is of more value in the determination of the presence or absence of tuberculosis rather than in its localization. The simpler methods of giving tuberculin are chiefly of use in this way. With the subcutaneous test, however, the presence of a local reaction may point out the seat of the lesion, and the character of the response obtained will aid us in deciding whether the lesion is active or quiescent. All these methods should be used and interpreted with care, but no single adjunct in diagnosis should replace repeated pulmonary examination.

2.—*Certain diseases associated with and simulating Phthisis.*

When phthisis complicates or occurs in coincidence with other diseases, its prognosis and treatment are frequently modified by the non-tubercular process. The relation between phthisis and certain other conditions is well known to the pathologist, but is less emphasized in clinical teaching. Considerable work has been done on the actual relation of valvular heart disease and phthisis, and special stress has been laid on the protective influence of passive hyperæmia in mitral stenosis. Tileston showed that in 4240 autopsies here in Boston, among 128 cases of mitral stenosis, there were only 20 cases of phthisis, and of these only one was active clinically and showed bacilli in the sputum. Nevertheless, every large series of cases of mitral stenosis recorded either at autopsy or clinically, shows a few cases of active phthisis, and a certain percentage appears in mitral regurgitation and aortic disease. From the other point of view, every large series of cases of phthisis contains a few cases of valvular heart disease. For instance, in 3056 cases of valvular heart disease in the wards and out-patient department of the Massachusetts General Hospital in the last ten years, a positive diagnosis of phthisis appears 33

times, or 1.08%. On the other hand, at the out-patient department of the Boston Consumptives Hospital, in 1688 cases of proven phthisis, valvular heart lesions were present in 42 cases, or 2.5%, of which 10 were mitral stenosis. Of the latter, however, only four were active cases of phthisis with bacilli, and one of these has actually acquired the heart lesion over a year subsequent to the proven existence of the pulmonary lesion while under observation. The same thing holds true in a recent series of autopsies at the Charité, where, among 505 cases of phthisis, there were 14 cases of valvular heart disease, only 3 of which, however, were active and recognized clinically. Without going into further details, it seems fair to say that valvular heart disease occurs more or less frequently with phthisis, and therefore, when the former occurs with suspicious symptoms, these cases should have the benefit of pulmonary and sputum examination.

Phthisis was noted as a frequent complication of Bright's disease so long ago as 1845 (by Peacock). Statistics on the relation between nephritis and phthisis are exceedingly unsatisfactory, because of the well known fact that phthisis frequently produces nephritis. Certain cases, however, will show at autopsy that there was a preceding renal lesion. The prognosis of such cases is distinctly grave. A case was recently under observation in which there was a history, dating back 18 months, of cough, loss of weight and strength and hæmoptysis, in a woman of 28 years of age. Physical examination showed a condition of advanced phthisis. There was also a history of transitory œdema of the hands and face. Before a specimen of urine could be obtained the patient had a severe convulsion, and the urine was later found to be loaded with albumen and casts. Further inquiry demonstrated that ever since scarlet fever in early childhood the patient had had polyuria and nocturia, and that she had been told several times that her kidneys

were diseased. It is easy to see how a full diagnosis might not have been made if the convulsion had been the cause for calling the physician, and how the prognosis of the phthisis was affected by the nephritis. Eight cases of apparently antedating nephritis have been found in the Boston Consumptives Hospital Out Patient Department, while at the Massachusetts General Hospital, among 1176 cases of chronic nephritis, there have been 8 cases of phthisis. Diabetes is supposed to render the patient prone to succumb to consumption, and Naunyn, in Nothnagel's system, quotes some very striking figures to that effect. Griesenger, in 250 autopsies on diabetics, showed that 42% had phthisis. In 31% it was one of the causes of death. Freichs, in 55 clinical cases of diabetes, had 25 cases showing phthisis. Naunyn, in 252 cases, had 33 instances of phthisis. Germain-Seé states that 2.3% of diabetics die of phthisis. In all, of 557 cases of diabetes 154 had phthisis, or 27.7%.

Here in Boston the figures are very different, for among 415 cases of diabetes at the Mass. General Hospital only six times does the clinical diagnosis of phthisis occur, with one additional case of miliary tuberculosis; and in only one case where a patient died of diabetes was unsuspected phthisis found at autopsy. Similar statistics have been obtained at the Boston Consumptives Hospital clinic, where only two cases of diabetes have been found among 1688 cases of phthisis in the past 21 months.

Bronchial asthma and chronic bronchitis also occur in conjunction with phthisis. At the Mass. General Hospital, among 508 cases of chronic bronchitis, phthisis has occurred 14 times; among 419 cases of asthma, five times. Out of 1688 cases of phthisis at the Boston Consumptives Hospital there has been 11 obscured by asthma and 10 by chronic bronchitis. Furthermore, of the 21 cases just mentioned, seven showed no physical signs of phthisis before a positive sputum was obtained, and five of the seven gave very little

definite evidence of the location of the process after repeated examinations. The diagnosis of chronic bronchitis or asthma should be made with a certain mental reservation, and should be accompanied by continual observation of the patient. Last, but not least, of the diseases obscuring pulmonary tuberculosis is the whole "nervous" symptom complex. It may be of interest to note that, in one out-patient clinic in this vicinity, 24 of the 2363 cases of phthisis were classed as neurasthenia, dyspepsia, and debility for some time before the correct diagnosis was made. It is equally instructive to observe that in the first thousand there were 13 such cases, in the second thousand seven cases, and in the third thousand only four cases, so disclosed. Two very striking cases have recently been under observation. The first patient was a woman of 29 years of age. Without physical examination she was given electric and mechanical treatment for her nervous cough and dyspepsia for one year. At the end of that time hæmoptysis began, sputum was positive, and the case was in the second stage at the first examination. The second patient, a woman of 40 years of age, had had violent attacks of hysteria and gastric indigestion for years. For two months she complained of indefinite pains in her chest, and was more nervous than usual. Finally she began to vomit continuously, and the diagnosis of gastric ulcer was made. She was sent to a general hospital for operation. The abdomen was negative, the chest nearly so, but the sputum was loaded with bacilli, and in a few days the patient was in a private sanatorium for tuberculosis. The diagnosis of neurasthenia should not be made until phthisis has not only been searched for, but even ruled out.

Of the non-tubercular conditions which more often simulate phthisis, some of which are often associated with it, asthma and chronic bronchitis are fairly frequent, 30 cases of the former and 88 cases of the latter, with no evidence

of phthisis, having been recently observed at the Boston Consumptives Hospital. Chronic influenza is much less frequent, and is only diagnosed by long observation and study. Occasionally, however, patients appear with a history of years of cough, large amount of sputum, often with hæmoptysis and fever, and showing the physical signs of consolidation. Repeated sputum examinations show only enormous numbers of influenza bacilli or perhaps a mixed infection with pyogenic organisms. Some of these patients are in excellent general condition, while others may be emaciated to the last degree. Two such cases have been under our observation. Both were children of 8 and 12 years, respectively, in whom there were signs of consolidation at the apices. Sputum examinations showed influenza bacilli, but no tubercle bacilli were present. A tuberculin test of 10 mg. was negative in each case.

Of the cardiac conditions, acute endocarditis is perhaps as baffling as any. A boy of 8 years was recently seen with the history that since he had measles, two years ago, he had never been well; that he had frequently suffered for weeks at a time with a cough, fever, night sweats, pallor, and loss of appetite. Physical examination of the lungs was negative, but there was obvious cardiac hyertrophy, and murmurs were present, and became more marked under observation at both the mitral and aortic areas. Further questioning brought out the fact that he had severe "growing pains" during the attack of measles, and at times afterward. Occasionally a definite history of phthisis is obtained in a case where negative chest examination, together with hypertrophied heart and typical urine, have made the diagnosis of chronic interstitial nephritis clear. One very marked case of consolidation of the lung, with a suspicious lesion in the throat, has cleared up entirely and rapidly under treatment with mercury. A similar case is now under treatment. Finally, two young women with almost every symptom of

phthisis, including fever and hæmoptysis, but whose chests were entirely negative, proved upon blood examination to be cases of pernicious anæmia.

In conclusion, we wish to offer a plea for the more extended use by the practitioner of such methods of diagnosis as are easily within reach of every medical man, and for the exercise of infinite pains and judgment in the early detection and treatment of pulmonary tuberculosis.

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DISCUSSION.

Dr. W. A. Griffin, of Sharon: I think no one will gainsay for a minute that early diagnosis of tuberculosis is one of the most important diagnoses a medical man can make, but it is not by any means easy. We do not have, for example, the laboratory assistance that we have in other diseases. In typhoid, serum and blood tests have recently become great aids. In diphtheria, the test tube and microscope quickly establish our diagnosis, but in tuberculosis, as Dr. Floyd has said, our main reliance is upon the physical examination. In case of doubt it is better to consider a case tuberculous, and to treat it as such, than it is to procrastinate until the signs and symptoms become so marked that even a layman could be hardly excused from making a diagnosis. It is better to send several doubtful cases to some one giving special attention to lung troubles, and have them all sent back as not having tuberculosis, than to have one patient diagnosed too late. The patient and his friends also will applaud excessive zeal much quicker than they will condone any negligence.

I regard the use of thermometers, as referred to by Dr. Floyd, of very considerable value, and at the Sanatorium we always keep a two-hour chart for two days when the patient first comes in. In private practice a new patient could be taught the use of the thermometer, and a chart could be plotted from his readings. In this way a suspicious rise sometime during the twenty-four hours is easily noted.

As regards examinations for tubercle bacilli, there is always the chance of missing them. I remember one case whose sputum I examined several times with negative results. I also examined the sediment after treating the sputum with soda, as Dr. Floyd describes, but it was only after injecting some of the sputum into a guinea-pig that I was able to demonstrate tubercle bacilli.

As regards making physical examinations, it is important to look over the entire chest. We have at present, in the Sanatorium, a case in whose chest a very good diagnostician found nothing. This was because he did not examine the extreme lower parts of the back.

Dr. C. S. Millet, of Brockton: Dr. Floyd has covered the ground so thoroughly that I fear I cannot add anything of importance to the discussion.

If I were disposed to make any criticism, it would be that he has asked us to take up an advanced course in clinical diagnosis before we have mastered the first principles. There are two things which I think he has not mentioned, that I should like to bring out. First, the most neglected point about early diagnosis is that the majority of us fail to make one. Too many patients are still going through our offices without having the clothing entirely removed from the chest when an examination is made, for us to dwell long upon the fine points; we would much better spend our time learning the essentials of a physical examination. Dr. Griffin has just illustrated this idea by telling us about the case which he saw recently, where the disease was located in the back, and which had never been discovered by the very able physician in attendance.

The second point which I wish to emphasize, is that we are all far too apt to rush forward to an auscultatory examination, without taking time to consider the other physical

signs, which I am almost ready to claim are of greater importance. At any rate, I will say that if one cannot make a diagnosis of incipient disease without the stethoscope, he certainly cannot make it with that instrument. If he must wait for auscultation to help him out, he in all probability will consider advanced disease as the first stage of tuberculosis. Certainly inspection, palpation and percussion, in general, as distinguished from local changes, are the most frequently neglected points about diagnosis, whether it is made early or late; and it is because I wish to make this most emphatic, that I will pass over one or two differences of opinion which I might have with Dr. Floyd.

There is one thing, however, to which I must refer. Dr. Floyd has said that a high bacillary count is of no importance. This is so contrary to my experience that I cannot pass it by. It is, of course, undoubtedly true as regards one examination; but, in a case that is otherwise doing well, the presence of a persistently large number of bacilli in the sputum is, to my mind, very significant,—the danger of exacerbation being present until the bacilli have largely diminished or disappeared.

Perhaps we may have tuberculosis carriers, much as we have typhoid distributers; but such cases are, I think, rare, and the danger is at least fully as great to the one who carries the disease, as to those individuals about him.

A persistently high count means that you must watch your patient very sharply for over a considerable length of time. These are the patients who, if allowed to give up treatment to a certain extent, must be instructed to return at stated intervals for a careful physical and bacteriological examination.

Dr. David Townsend, of Boston: There is little more that I can say regarding the pulmonic signs of tuberculosis, aside from the points which have already been brought up. I must say as regards the use of the thermometer, I think the average physician does not use it half enough. It is a great aid in the diagnosis of tuberculosis. In the majority of cases that come to us it is only by using a thermometer that we find there is anything present. Very few temperatures of 98° continue day after day. It is one of our symptoms we cannot afford to miss. It is difficult to get our

patients to take their own temperature. They will not take it regularly, so that it is very hard for us to go by it. We must insist that they take their temperature regularly, to help us, at say two and three hour intervals, so that we can know at the end of two or three days if their temperature has made slight progress. As regards the pulse, I think that is another symptom which we ought to take into consideration. The loss of weight is another thing which to me seems to be of especial importance.

Dr. A. K. Stone, of Boston: Dr. Floyd has been over the ground so carefully, and so many points have been brought out, that I am simply going to call attention to one other sign along the line of Dr. Millet's suggestion,—that we should pay more attention than we have formerly to inspection and palpation. I recently had my attention called to a new sign that Dr. Pottenger of California suggested about a year ago. He is very enthusiastic about the fact that the rigidity of the muscles directly over the lesion in the region of the lungs, is very suggestive of the seat of trouble. I took a group of patients in the out-patient department of the House of the Good Samaritan, patients that Dr. Floyd has had under charge for some time. Some I found in whom this stiffness was perfectly well marked were incipient cases. Some I examined had been true incipient cases when they came. I certainly found that even in my inexperienced hands there was something in the test; and I made comparatively few mistakes in locating the seat of the lesion from the results of my findings of muscular rigidity with the tips of my fingers and comparing these findings with the chart in Dr. Floyd's records. In one instance I found that the left front and back were slightly involved, and also the right back to a very slight degree. In another patient I found that the mid-chest front and back were involved, where I had no idea such a lesion existed, and I found that I located it exactly as Dr. Floyd had it located after his careful examination. Therefore I am going to ask all the men present to try this sign and use the fingers. Simply use the tips of your fingers in the intercostal spaces, about the scapula, and note the tonic spasm or rigidity of the muscles over the pulmonary lesion.

ARTICLE XXXV.

THE ANNUAL DISCOURSE.

DYSPEPSIA AND INDIGESTION VIEWED FROM A SURGICAL STANDPOINT.

By JOHN C. MUNRO, M.D.
OF BOSTON.

DELIVERED JUNE 8, 1910.

NOTE.—At an Adjourned Meeting of The Massachusetts Medical Society, held Oct. 3, 1860, it was

Resolved, "That The Massachusetts Medical Society hereby declares that it does not consider itself as having endorsed or censured the opinions in former published Annual Discourses, nor will it hold itself responsible for any opinions or sentiments advanced in any future similar discourses."

Resolved, "That the Committee On Publications be directed to print a statement to that effect at the commencement of each Annual Discourse which may hereafter be published."

DYSPEPSIA AND INDIGESTION VIEWED FROM A SURGICAL STANDPOINT.

Mr. President and Fellows
of The Massachusetts Medical Society: —

As the art of surgery advances and as the living pathology of the abdomen is studied in its relation to clinical symptoms, the surgeon is assuming more and more jurisdiction over those fields of disease that formerly were considered wholly medical. Many symptoms once regarded as expressions of functional disorders are now believed, and with good evidence, to be due to slight pathological changes in the various viscera. The existence of these pathological changes has been recognized post mortem, but their significance has been overlooked or underestimated by the pathologist.

The interrelation between the various viscera of the abdomen is so close and complete that a slight pathologic disturbance in one organ can and may be manifested in an organ apparently quite dissociated. A similar interrelation between the viscera of neighboring cavities renders this complexity still more puzzling at times. When, however, we consider the embryological, the functional and the neurological relations of the various organs, light is thrown on many of these puzzling phenomena. The association of external genital malformations with ectopic kidney, the signs of an appendicitis in pneumonia or the pyloric spasm that follows irritation of the cæcum and appendix, may be cited as crude examples. It would be interesting to take up these many complex associations, but as it is I shall consider only one broad division of symptoms, dyspepsia and indigestion,

as it bears on remote, often unsuspected slight changes in a few of the abominal viscera, viscera that are most frequently observed and handled by the operating surgeon and with whose multifarious pathologic changes he becomes more familiar than the internist or even the pathologist.

The terms dyspepsia and indigestion, so vague and all embracing, have for the most part been considered as the result or expression of functional disturbances or of neuroses, whatever that term implies. Yet I believe that a proportion larger than at first sight would be granted by the clinician are really due to definite pathological lesions unsuspected or even denied up to within a few years. To deny on the other hand that dietetic errors, syphilis, arteriosclerosis, fatigue and other general functional causes may produce a dyspepsia or indigestion, would be absurd on the face of it. When, however, in spite of treatment directed to the commoner functional causes, the symptoms persist, or persist in recurring, then the physician must consider the various visceral lesions that are so familiar to the surgeon and whose elimination so readily brings a cure. The physician who prescribes for an indigestion on the train of symptoms narrated to him by his patient, and without making a thorough examination and instituting a careful questioning of his patient, is guilty of something akin to malpractice. This is a time-worn truism, but it has need of repetition to-day if I may judge from the accounts of many of our surgical patients. Within the last few years we have seen hundreds of patients who have been treated offhand by their physicians for functional dyspepsia, when a little care in examination or cross questioning could not have failed to demonstrate a subacute or chronic appendicitis, a cholecystitis or duodenal ulcer. In calculating the individual attacks that these patients had suffered and for which they had received palliative or temporizing treatment, I find that the numbers rise into the thousands. Lest I may be unjustly misunderstood it is fair

to say that in many instances attacks have been recognized as due to a surgical lesion and operating has been advised, sometimes urged, while in others, attacks have been borne without professional aid, the patient perhaps having recourse to home remedies, patent medicines or to no treatment at all.

Furthermore, in justification to all of us, physician as well as surgeon, a certain small proportion of such cases are most obscure and misleading, so called border-line cases in which the patient must be frankly told that there is probably some visceral lesion the true nature of which cannot be determined without surgical exploration. To throw some light on this class, especially, I beg to offer some conclusions to-day, so far as they can be called conclusions when the definite interrelations can be determined only with time and by the concurrence of other observers in similar fields.

That I may swing too far to the surgical side is natural, but no one is aware of that fact better than I am. I fully realize that the family doctor sees many cases of dyspepsia that quickly and happily yield to slight medication, change of diet, habits, etc. These patients naturally never come to a surgical clinic. Nevertheless, when I read over the histories of hundreds and hundreds of our abdominal cases in which the symptoms are pre-eminently dyspepsia and indigestion, I believe more firmly than ever that every case of recurrent or obstinate indigestion that does not yield to the intelligent treatment of the internist, should have an opinion from one who views things through surgical glasses if for no other reason than to eliminate the advisability of operation.

To emphasize the occasional difficulty of diagnosticating these cases it is not infrequent that a consultant refers to us a case of ulcer, gallstones, etc., where we cannot find any specific excuse for operating. That we ourselves overlook a surgical lesion is occasionally proven by a later outburst of definite signs and symptoms, or what is more embarrassing

by the uncovering, at the hands of some wiser surgeon, of symptoms that we had made light of, or of a history that we had not been intelligent enough to extract in our cross examination.

In all our laparotomies where there has been an exploration "seeking for knowledge" it is extremely rare that we have not discovered some definite causative pathology, except in a small group that I shall consider later. That the future will modify my views in one way or another goes without saying. It is the history of all surgical and medical advance that the views of to-day are changed to-morrow.

It is no argument for the skeptic to declare that because he has never seen such and such a surgical condition, it cannot exist. That argument has been fought out over and over again in relation to the frequency of gastritis and duodenal ulcer, the relation of cancer to ulcer, etc. I well remember being told some years ago by a medical practitioner, whose experience and judgment represented the highest in this vicinity, that he had never seen a death from hemorrhage in a case of gastric ulcer. With my limited experience at that time I had already seen six cases. For how many years did we accept the statement based on the authority of the keenest observers that duodenal ulcer is a rare disease? We now believe that it not only is doubly as frequent as gastric ulcer, but if Codman's researches are confirmed, we must look upon it as being quite as common as appendicitis.

On the basis of this long preamble I would ask you, as workers in the field of general medicine, because it is to you primarily that I appeal, to weigh what I have deduced from a pretty close analysis of a few general types of abdominal disease in the relation of definite pathological lesions to the common symptoms dyspepsia and indigestion. There is hardly a single item that is new; there is hardly one however that does not need constant reiteration if one may judge from the experience of a single surgical clinic. I

have purposely excluded all cases with definite pelvic and genital lesions and obvious gross ulcers of the duodenum and stomach.

That I shall be misinterpreted by some I am fully aware. Suffice it to say that I do not believe in opening every belly for symptoms of indigestion or of neurasthenia. I do not believe however that there are unfortunates suffering from *so called* (mark the word) nervous dyspepsia, indigestion, neurasthenia, etc. who can be cured by surgery alone. The true neurasthenic with incidental digestive symptoms should almost never be operated upon. A neurasthenic on the other hand who suffers from some pathological lesion should be granted surgical relief (if necessary) from the effects of that lesion, but should not be given any assurance of relief to his or her neurasthenia. The so called dyspeptic neurasthenic is often another story altogether. Such a patient is unjustly stigmatized on a false diagnostic foundation, and he may derive great benefit from surgery if his pathology is correctly interpreted.

I hasten to beg and pray therefore that no one of you will assume that our clinic may be offered as a harbor for your neurasthenics for whose welfare you are at your wits' end. A very small proportion is suitable for surgical consideration. The vast majority are still in our judgment most unsuitable for operative relief.

A number of years ago, when surgeon at the Boston City Hospital, where a good share of abdominal operating was in acute or emergency cases, I analyzed 200 consecutive laparotomies with a view to determine the extra responsibility placed upon the operating surgeon, from the fact that he had to work at a period of the disease less favorable to the patient from the point of view of immediate and ultimate prognosis. Sixty per cent. of the cases came too late for advantageous interference. In other words many a sufferer was brought to operation as a last resort, facing a high

operative mortality and morbidity, whereas had he entered early in the course of the disease, allowing a reasonable time for diagnosis, the risk would have been reduced tens or hundreds of times. Happily this condition has bettered itself as surgeons have improved in technique, as the general practitioner has accepted the lessons taught by surgical experience, and more than that by the demands of a progressively better educated lay public.

The first group of sufferers from indigestion and dyspepsia that I wish to consider to-day is made up of those patients that have infection in the biliary passages. In the last year and a half we have operated upon 70 cases of this type, and an analysis with reference to the digestive troubles alone is in order.

Just as in our appendix cases to be considered later, the terms indigestion and dyspepsia are used by the patients themselves and are taken from the histories as given to the surgical house officer. I find that many of them date the origin of their digestive troubles for ten, fifteen and twenty years before entering the hospital. Attack has followed attack, each one leaving the pathology increasingly difficult to deal with, often so difficult that an operation of the gravest nature must be offered them, occasionally with fatal issue. Had the true pathology been recognized and dealt with within a reasonable time the risk to life would have been scarcely greater than that of an interval appendix operation. Nearly all of them had been treated or had treated themselves for indigestion. Although, as our own experience shows, a diagnosis might not be so clear early in the case, yet the very fact that these invalidating attacks recur time after time should be enough to compel surgical advice if not operative interference.

These infections are not necessarily confined to those past middle life. Our cases demonstrate that forty per cent. occurred in patients under 40 years of age, two of them being

12 and 16 years old respectively. If now we calculate the age of onset of the primary infection, the youthfulness of patients liable to gallstones or biliary infections is doubly emphasized.

Nearly ten per cent. of our cases had developed carcinoma, which in most instances could have been forestalled by timely operation.

Those of you who have been obliged to deal at operation with the complications and difficulties that result from successive attacks of inflammation in the biliary passages, will readily sympathize with my plea for any reasonable excuse to operate early in patients suffering from the indigestions associated with this type of lesion. I do not hesitate to lay the blame of some of our failures on the fatal procrastination advocated by the conservative practitioner who still clings to the time-worn fallacy that gallstones are harmless, or at most very slightly harmful.

Occasionally we accidentally discover gallstones when operating for other lesions such as fibroids, umbilical hernia, etc. On later critical cross examination of such patients however, we generally find that we can bring forth a group of symptoms referable to the gallstones which had been overlooked, or had been ascribed to the lesion for which we primarily operated.

The disease that I wish to call attention to mainly in connection with my subject to-day is appendicitis. I have carefully analyzed 250 recent cases almost entirely with reference to the symptoms indigestion and dyspepsia.

However early our patients come to us for operation, and the gain is a marked one within the last ten years, there is still a considerable proportion that go on year after year, suffering from indigestion and treated accordingly by medical means, when really they are suffering from repeated attacks of appendicitis, which in the majority of cases ought to be recognized if a reasonably intelligent examination

were made. Many and many a patient comes to us with the history of long and varied treatment for intestinal indigestion. Indeed, I have heard this expression so commonly associated with genuine appendicitis or gallstones that I begin to wonder if there is such a definite disease by itself. It is well to bear in mind that most of our patients are in adult life, a fair proportion being quite advanced in years. About 20 per cent. of the cases under analysis entered the hospital in their first attack. They gave no account of early belly aches, inflammation of the bowels, weak stomachs, indigestion, etc. Apparently the primary attack came out of a clear sky, and if they entered early enough the operation and convalescence became of slight importance. A little closer examination however of this group reveals the fact that nearly half of them had appendices with evidence of chronic or subacute infection, and the existing attack had persisted from four days to several weeks in various individuals. In other words the patient had dragged around for days or weeks with indigestion or belly ache never severe enough to excite alarm.

The larger part of this group, dating their existing attack in the same way for days or weeks, entered the hospital because the termination of the attack became fulminating in character and many entered with diffuse peritonitis, or even moribund. In other words about 30 of the 50 patients required drainage, suffered as all advanced cases do, and ran the risk of operative death or of the various unhappy sequelæ. The mortality of 33 per cent. in this smaller group of thirty is a frightful one and the morbidity is equally frightful. A number were moribund at entrance and died at once without operation. In a few a tense abscess was opened under primary anæsthesia. Some survived the immediate operation to die later of secondary infection. Assuming all the responsibility that belongs to us for such a mortality, the discouraging part to us is the fact

that every individual patient for days or weeks gave definite and legible signs of a so called and so treated indigestion. Contrast this with a second group of fifty cases in which the present attack, the primary one, had its inception within four days of operation. Although most of these cases were drained, the attack starting as a frank one, no deaths and no sequelæ followed. The patients were not handicapped by a chronic sepsis; they had not been starving for an indigestion, consequently local drainage of a local infection sufficed to bring about a rapid and safe convalescence. This type of case rarely gives us any anxiety. It is perhaps asking too much that patients in this class should reach us much earlier, that is by preference within 36 hours of onset, because frequently the patient does not summon medical aid for a day of two after he finds that home treatment is of no avail.

Of 90 cases that had suffered from one to three attacks previous to operation, the acute (drainage) and chronic (clean) cases are about equally divided. The early attacks came at intervals varying from months to years; each one was typical of an appendicitis, of short duration, disappearing without leaving any trail of symptoms. This group is the only one that is apparently free from symptoms of indigestion. Most of them came to operation within two or three days of onset of the final infection, all recovered, and there is no excuse for including this group in the groups suffering from indigestion. Each early typical attack of appendicitis left the patient no worse than before except for the increased assurance of a subsequent attack.

The next or what may be termed the invalid group is of much more interest to the general practitioner and to the surgeon. These patients, 80 in all, suffered from five to innumerable attacks, or else were constant sufferers for months or years from symptoms generally described and treated as indigestion. The detailed histories teach us that

some patients complained of constant abdominal pain lasting for weeks or months. Nearly all had more or less constant soreness of the abdomen, and a great many dated an increase in constipation from the outset. Some were confined to bed with attacks of indigestion at shorter or longer intervals; others were practically bedridden for months. Some lost weight up to 20 and 30 pounds, while in others the nutrition does not seem to have been disturbed at all.

As in the other groups most of our patients were adults, but I find one child of 13 that has been treated for eight years for numerous attacks of indigestion accompanied by vomiting. Some patients referred their pain, distress or nausea to the ingestion of food and had reduced their diet to the simplest equation possible, their health and resistance suffering correspondingly. Not a few had been put on a strict diet by their family physicians.

If we look at this last group of 80 cases from an economic point of view, the patient has a right to protest at our failure to recognize and treat his disease. Every patient suffered at least five attacks, others too many to be counted. If now we choose ten as the average number of attacks in which the patient was invalided for a few days at least, it means that these people suffer at least 800 attacks of pain, suffering and anxiety to say nothing of the current expense of treatment, the loss of time and wages and the detoriaration in productive health.

Of the last group that I wish to consider to-day I must frankly confess that we cannot yet dogmatically determine which will be definitely cured by operation, though we are gaining some light as to those not benefited by the removal of a damaged appendix. To analyze them in detail needs more time and postoperative observation. They can be classed roughly as cases of appendicitis with gastro duodenal symptoms, the latter varying within wide limits.

Before taking them up in detail a short retrospect of re-

cent gastric surgery is necessary. In 1904 I had the honor of reading before this Society a paper strongly advocating gastroenterostomy in ulcer of the stomach. The criticism of the internist at that time was that only in the presence of obstruction or serious complication was an artificial stoma justifiable. This criticism was just, and so far as it covers the ground it is accepted by surgeons after a thorough and impartial trial of the operation in all types of so called stomach lesions. Unfortunately it is applicable to only so called gastric diseases; there still remains a considerable number of patients that need relief by some means from most distressing gastric symptoms.

Surgical enthusiasm has at least demonstrated the frequency of duodenal ulcer as compared with gastric, thus throwing light on a group of dyspeptic symptoms that had never before been satisfactorily elucidated.

We are yet in the dark, however, in the treatment of the so called gastric neuroses. At the time of my paper mentioned above we were deliberately subjecting the worst types of gastric neurotics to a gastroenterostomy, to demonstrate whether the symptoms were merely secondary to improper drainage alone or whether there was some other unknown but discoverable cause. It is only reiteration to declare now that gastroenterostomy in such cases not only is of no value but in certain instances the symptoms are aggravated. This fact both Dr. Mayo and myself strongly emphasized at the Congress of Physicians and Surgeons in 1907, and we feel now that one who makes an artificial opening in the absence of a gross lesion is guilty of meddlesome surgery.

Can anything be done for these unhappy so called gastric neurotics? For certain types I believe much is possible, for others surgery is either powerless or of little use even where there is an unmistakeable lesion of the appendix.

For some time we had noticed in our clinic that certain patients exhibiting most marked gastric symptoms were

cured by the removal of an appendix moderately damaged. Mayo called our attention to the same fact, and soon afterwards published his observations on the relation of pyloric spasm to an inflamed appendix. Recent papers by Morris, Moynihan, and Graham and Guthrie serve to clear up more and more certain types of this group. We have found that the individual variations in signs and symptoms are quite considerable, and although certain types can be and are relieved by appendectomy of all their gastric symptoms, others are not, and the exact line of differentiation is not yet clear to us.

We have operated upon some thirty or more patients included in this group and in every one the appendix has shown a definite pathologic lesion of one type or another such as stricture, punctate hemorrhages, obliterative atrophy or infection secondary to concretions.

A half dozen of the patients had such severe attacks of gastroduodenal hemorrhage, either in single attacks or in attacks more or less separated one from another, that there was no reasonable doubt of an actively bleeding ulcer in the stomach or duodenum. In nearly all of the thirty cases the abdomen was opened first of all in the upper quadrant. In some, although we were suspicious that the gastroduodenal symptoms were really due to an appendicitis, especially as we found evidences either in the protocol or at examination of an active infection in that organ, we did not feel justified in operating without a most painstaking examination of the viscera in the upper part of the abdomen.

Barring those with profuse hematemesis the larger proportion of these patients suffering from appendix indigestion have been greatly benefited or cured, but the lapse of time *post operationem* is not sufficiently long to allow us to speak authoritatively. A few in whom there were associated evidences of definite neuroses apparently have not been relieved of their latter stigmata.

Although one or two patients with severe gastric hemorrhages have apparently been relieved of all their digestive symptoms since operation, I do not feel at all sure that the relief is because of the appendectomy or that it is permanent.

In every abdomen in this last group a careful examination revealed no gross pathological lesion in any other organ except a perihepatitis of unknown origin in two cases. In a few there was ptosis of some of the organs to an extent that by some would be considered causative of functional disturbances, but our increasing experience in dealing with the abdominal cavity in all types of disease has taught us to be extremely conservative in declaring visceral ptosis, unless perhaps it is extreme, as either abnormal or pathologic.

To conclude very briefly I would again beg the general practitioner to consider the probability of some simple surgical lesion of the abdominal viscera in his cases of persistent recurrent indigestion; that where such a lesion does exist surgery is the safest and surest means at our disposal to bring about a permanent cure; that his neurotics with indigestion secondary to surgical lesions have the right of relief from their local trouble; that finally there is a type of dyspepsia most naturally ascribed to gastroduodenal ulcer, but which is really secondary to an appendicitis, and which is curable to a degree not yet definitely determined, by a simple appendectomy.

ARTICLE XXXVI.

THE SHATTUCK LECTURE.

A CRUSADE AGAINST SYPHILIS AND GONORRHEA.

By FREDERIC HENRY GERRISH, M.D., LL.D.
OF PORTLAND, ME.

DELIVERED JUNE 7, 1910.

A CRUSADE AGAINST SYPHILIS AND GONORRHEA.

A FEW years ago, in conversation with a distinguished fellow of this Society, whose knowledge of syphilis is profound, I asked his opinion as to the prevalence of that disease in this community. A look of great seriousness came into his face, and, after a significant pause, he said, "Of course, you know that nobody can answer that question with precision; but sometimes I would not avouch for anybody's freedom from syphilis outside of my immediate family." This statement was not intended to imply that probably only one household was uncontaminated by the malady in question, for my friend is not such a cynic as Ricord, of whom Dr. Holmes said that he was "a sceptic as to the morality of the race in general, who would have submitted Diana to treatment with his mineral specifics, and ordered a course of blue-pills for the vestal virgins"; but was merely meant to convey the idea that, in moments of depression, induced by frequent discoveries of syphilis in cases where its existence could not fail to cause a shock of alarm and disgust, he felt himself secure against surprise at its revelation anywhere.

Doubtless every one present has seen in recent literature estimates of the prevalence of gonorrhea, some writers alleging that eighty or ninety per cent. of the adult male population either now has, or at some time has had, it. Without expressing confidence in the correctness of these figures, the most reluctant conservative must admit its wide distribution.

In the prescription of conditions under which the foundation establishing this lectureship is to be administered, one class of subjects particularly specified for treatment is diseases of the inhabitants of this commonwealth; and I have begun my essay as I have in order to show that the requirement of the benevolent founder is complied with, and that, by so much, the subject to which I have the honor to ask your attention to-night is justified.

In the discussion of any subject it is important to avoid exaggeration, and the necessity for this caution is proportionate to the gravity of the topic under consideration. Extravagance weakens, rather than strengthens, the effect of a statement; and, consequently, in the propositions presently to be submitted, it will be my endeavor to keep so clearly within the bounds of admitted truth that nobody, who is acquainted with the matters presented, will have an opportunity for dissent.

As these statements are to a large extent elementary, it may appear unnecessary, and even impertinent, to introduce them before this learned audience; but there have appeared so many articles, seemingly authoritative, in which the innocuousness of syphilis is asserted, and objection made to certain things on which there should be unanimity of opinion, that I deem it important to present them.

FACTS ABOUT SYPHILIS.

About syphilis authorities are agreed upon the following points:

It is constitutional, affecting every organ and every tissue.

It is either acquired or inherited.

The first evidence of acquired syphilis (the initial lesion) is the chancre.

The secondary manifestations of the acquired form, as well as the chancre, are powerfully infectious.

The tertiary lesions, while not clinically infectious, have

no tendency toward spontaneous cure, but always toward destruction of tissue.

The cause of syphilis is either a microscopic parasite, *Spirocheta pallida*, or some micro-organism in whose life-cycle Spirocheta pallida is a phase.

The acquired form is usually conveyed in sexual congress, and hence, the disease is commonly called venereal; but in many cases it is communicated by immediate contact other than sexual, or through the intermediation of clothing, utensils, and other objects of common use among the individuals concerned. Probably five per cent. of cases are thus caused.

The poisonous discharges of syphilis cease to be infectious in twenty-four hours, and in a fourth of this time, if dried; otherwise the disease would be vastly more prevalent.

If the acquired disease is treated early and properly, it is curable to this extent: first, that the patient can beget (or conceive) offspring who are not syphilitic; and, second, that, in about three-fourths of the cases, the patient will have no tertiary manifestations; but it is impossible to predict with certanity the event in any given case—no guaranty of future immunity can honestly be given.

Specific treatment needs to be continued vigorously at least two years, and one cannot be confident of the patient's ability to procreate non-syphilitic children until two years have elapsed from cessation of treatment and after the last appearance of a syphilitic symptom. In properly treated cases the time from infection to the period of safe propagation of the species is five years.

Doubt of diagnosis can be dissipated by repeated, thoroughly skilful examinations for the spirocheta.

Syphilis is one of the commonest diseases. While its prevalence cannot be precisely determined, those best able to judge declare their belief that ten per cent. of the community are affected by it.

Scheube in 1902, after investigation on a large scale, declared that syphilis has become almost universally prevalent in tropical and subtropical countries. When introduced into a community previously free from it, the havoc which it creates is appalling. This is illustrated in the Sandwich Islands, to which syphilis was carried by the sailors of Captain Cook. The present native population is but a fraction of what it was before the Caucasian invasion, and the enormous reduction is evidently due to the ravages of this disease. To this unfortunate people civilization spells syphilization.

Of the acquired form eighty per cent. of cases begin between the ages of nineteen and thirty-five.

Aside from the mortality of syphilis, its effect upon the health of the community is profound. It is a large factor in the causation of various diseases, which are not generally associated with it in the public mind, and, in addition to these frankly expressed manifestations, it is at the bottom of much lowered vitality, which renders the system less resistant to the attacks of any disease.

It is not often named in mortality statistics; but it is responsible for a vast number of fatal results, reported under other names, and probably is surpassed in deadliness only by tuberculosis. The death-rate of syphilitics is nearly fifty per cent. above that of non-syphilitics at corresponding ages.

It effects its destructive work by causing degenerative changes in various tissues, particularly those of the arteries and of the central nervous system.

One attack of syphilis usually insures immunity for life. "In the present state of our art a second attack of syphilis is the only possible proof that the patient has recovered from his first attack." *

Hereditary syphilis differs in character in no wise from the acquired disease, but there is no chancre.

* E. L. Keyes, Jr. (1908).

It is extremely fatal, destroying many children in utero, many others soon after birth, and others still after years of apparent health.

FACTS ABOUT GONORRHEA.

Gonorrhea is commonly a local disease; but its poison occasionally enters the system, and causes trouble at points far from its usual sites.

Practically it is almost exclusively venereal in origin, and it is acquired only through contagion.

In the male it attacks primarily the urethra, from which it may extend to the bladder, ureters, and kidneys, and to the true genital passages, the seminal vesicles, and the testicles.

In the female the same urinary track may be followed; but more frequently the genital passages are involved in the extension—the vagina, the cervix, the uterine body, the oviducts, from which the disease may travel to the pelvic peritoneum.

Mortuary lists rarely, if ever, include its name; but indirectly it probably causes more deaths than does acquired syphilis, being responsible for most of the suppurative salpingitis, and a very large proportion of the cases of fatal peritonitis in women.

Short of destroying life it greatly reduces capacity for work, and causes an enormous amount of hopeless invalidism, especially in women.

In relation to the married state its consequences are momentous, in this respect rivaling syphilis. It is believed to be accountable for more than forty per cent. of the barrenness in childless marriages. No other disease is as potent in the production of sterility. In the male this comes about through the obstruction of the genital canal, causing scarcity, death, and entire absence of the seminal elements (oligospermia, azoöspermia, necrospermia), and interfering with, if not entirely preventing, fertile coition; in the

female by clogging the genital passage at some point, preventing the lodgment of the ovum, and establishing disease which makes impregnation impossible.

The infective material of gonorrhea attacks the conjunctiva with especial virulence. Of all the total blindness in this country fifteen per cent. is traceable directly to this disease. From one-half to two-thirds of the cases of ophthalmia neonatorum are of gonorrheal origin.

The prevalence of gonorrhea is enormous. No other disease of serious character is as frequent in the period of life between eighteen and forty years. Doctors who specialize on venereal are apt to say that ninety per cent. of adult males have had it; but, without taking as cynical a view as this, we must grant that it is shockingly common, particularly among men, and the highest social ranks present as great a proportion of cases as do the lowest.

Formerly it was considered a trivial malady; then came a period in which its gravity was exaggerated; and now we are able to take a judicial view of it, considering it neither of trifling account nor hopelessly intractable, but a disease of great seriousness in its bearings upon the individual and upon the community, hygienically, sociologically, and economically.

Though it is commonly treated insufficiently and improperly, the bulk of the cases are ultimately cured in the sense that they cease to be contagious; but an appreciable residue continue to be a source of infection for a long time. The gonococci may retain their vitality for years.

Among married women about a third of the cases of gonorrhea owe their origin to the husbands of the victims, many of the latter being unaware of the nature and source of their malady. To women it is a worse scourge than any other form of venereal.

In chronic cases a special and expert examination, repeatedly made, is necessary to determine the absence of the gonococcus.

To one who is not familiar with the results of the modern study of these two diseases, some of these statements will seem extreme and unwarrantable; but their moderation will be acknowledged by those who have looked carefully into the subject. Even if these conclusions as to the prevalence and influence of syphilis and gonorrhea were to be cut evenly in two, the moiety would present a picture of horrible ghastliness. One who wishes to make a deep impression in this matter does not need to exaggerate; he may safely discard half of his facts and still have so much left as to run considerable risk of being thought sensational.

To what is to be ascribed this grave condition, this wide distribution of two diseases demanding such a toll of health and life? The answer commonly given is Prostitution. While admitting a large measure of truth in this reply, it may well be insisted that other factors enter into the case, without the recognition of which no consideration of the subject approaches adequacy.

THE USUAL TREATMENT OF PROSTITUTION.

Prostitution is one of the chief banes of civilization. Every code of laws recognizes its existence, and makes a show of dealing with it. The methods adopted are multitudinous in their details, but all practically resolve themselves into two systems,—suppression and regulation.

Suppression aims at forcible extinction. The brothels are emptied, their proprietors are fined and imprisoned, their inmates are punished in various ways. The authorities nowhere persist steadily in their efforts, contenting themselves with spasmodic displays of virtue, which are usually productive of more harm than good. The expulsion of the abandoned women from the brothels drives them to practice solicitation on the streets, which had previously been free from the appearance of vice; or sends them into hiding in all parts of the community, often into domestic service in decent families, where their influence is most

corrupting. Even if the officers of the law could close every house of ill fame permanently, and could compel every quondam inmate to abandon her pernicious trade, the method will always fail from its inability to reach the vastly greater number of clandestines, who are less openly avowed prostitutes, but nearly, if not quite, as injurious elements of the population. Prostitution will never be stamped out as long as there is a demand for the service which it supplies.

Regulation is really a system of licensing; but the latter name is vehemently objected to by some advocates of the method, and others, still more squeamish, insist upon the euphemism of "toleration," on the ground that prostitution is not approved or legalized, but only permitted. The distinction is too subtle to be perceptible to the ordinary mind, particularly as, whatever designation is employed, the intent is the same, namely, to make intercourse with prostitutes safe; and the rules are identical, to wit, registration, examination, certification, and medication.

The avowed purpose of regulation is to afford to any married man, who wishes to commit adultery, and to any bachelor, who desires to perpetrate fornication, opportunity to gratify his sensual longings without danger of contracting disease. The same statute-book which declares adultery and fornication to be crimes, and prescribes penalties for their commission, offers through regulation peculiar inducements for their commission. It is as if the law against stealing were to be mated with one which put a premium upon theft, or as if the statute forbidding criminal abortion were followed immediately by one providing ready means for relieving women of the products of unwelcome conception.

But the practical provisions of regulation are always so faulty as to excite amazement that anybody with cerebral development above that of amphioxus should be beguiled into approval of them, or should think that they afford reasonable assurance of protection against venereal disease.

Two counts of the indictment against regulation are sufficient for its condemnation: first, the infrequency of the examination of the women, and, second, the entire omission of examination of the men.

First, as regards the women. Suppose that a prostitute is examined, and receives a certificate of health, and, also, that a chancre appears within a few hours upon some accessible part of her genital tract. The number of men whom she can infect before her next examination depends largely upon her opportunities. Acton reports the case of one woman who admitted that she sometimes received forty men in twenty-four hours. Doubtless this is exceptional, though quite credible; a harlot, who knows how to make her favors peculiarly acceptable, always has an abundance of followers. The most conservative will grant that a woman with an unrecognized chancre, who is in moderately active practice of her vocation, will probably infect one man a day for a week, at the end of which time the regular hebdomadal examination will reveal her condition, and her career as a scatterer of pestilence will be arrested for a time. Every one of the men, whom she has infected, felt a large degree of security after inspecting her card, but experienced what we often hear called the stinging rebuke of misplaced confidence.

Second, as regards the men. A woman passes her medical examination, and is legally qualified for a week of debauchery. Immediately comes a patron who has had gonorrhea, but, not having felt any symptoms or noticed any discharge for a long time, considers himself cured. Still, however, there linger in the crypts of his urethral mucosa some gonococci, and the violent congestion of the genitalia, combined with the exertion and friction of the coition, arouses these microbes from their quiescence, excites their reproductive activity, and results in their expulsion from their lairs and their introduction into the torrent of semen. Immediately active gonorrhea is started in the woman, and

before her next inspection she has communicated the disease to a number of her paramours.

But these illustrations, though legitimate and not uncommon, are subtle compared with the more usual methods by which the venereal diseases are disseminated under the license system. Men, who know that they have one or more of these maladies in an active form—an initial lesion, a secondary eruption, a persistent gleet—do not hesitate to seek their pleasure with prostitutes. They despise the whole class, however necessary they consider their services; they are absolutely regardless of the rights of the women as fellow human beings; they are brutally indifferent to the evil results of their own conduct to anybody whomsoever. The women, however suspicious of the condition of their patrons, do not dare to protest or to demand an inspection of the latter with reference to their possible diseases, well knowing that they will be promptly mauled into submission on the slightest display of such insubordination.

It is perfectly manifest that all efforts to keep the women free from disease are fruitless unless corresponding rules are applied to the men, who use them.

Some years ago a titled English woman* drew down on herself tremendous animadversions, because, finding that parliament was loth to abolish the "contagious diseases act," and wishing to show the absurdity and injustice of the law, and to create sentiment against the legalization of vice, she advocated a statute compelling equal examination of men and women; and yet her position was strictly logical and scientific.

If anyone, who is acquainted with the facts, is still unconvinced of the futility of attempts at regulation, further counts in the indictment may be brought forward, conspicuous among them being the incompleteness of the examinations of the women. Every student of the subject knows

* Lady Henry Somerset.

that an ocular inspection, however carefully made, cannot satisfy the demands of modern medicine. There may be no discharge of sufficient amount to attract attention, and yet the mucosa of the cervix may swarm with gonococci, which, in the intense congestion attending copulation, awake from their torpor, and the disease, of which they are the characteristic elements, receives a new lease of life, with all its old virulence and capacity for evil. But in no license system of which I have ever heard is microscopic examination demanded, although it is impossible to obtain the data necessary for an opinion without it.

One more factor demands mention in rehearsing the failure of regulation—the impossibility of including nearly all of the prostitutes. In the cities where the method has had its most complete trial the authorities have been obliged to confess that they have succeeded in registering only a fraction of them. As a rule, the women detest regulation, with its abridgment of their freedom, its insistence upon examination, its quarantine when disease is discovered, the infamy which it implies, the obstacle which it imposes to their return to decency of life, and its almost certain destruction of the chance of marriage, which with most women is vaguely or confessedly a cherished hope; and they evade inscription as far as they are able. Its alleged protection affords them no advantages commensurate with its drawbacks. Only the most abandoned of the fallen women are willing to admit that prostitution is their vocation; it seems less of a slavery if they can delude themselves with the thought that it is an avocation. Obviously the difficulties of complete enrolment are insurmountable, and practically the system has nowhere approached thoroughness. The clandestine prostitutes far outnumber the registered, always and everywhere.

This opposition on the part of the women has a counterpart in the attitude of the majority of the patrons of prosti-

tution. The average man is allured by the secrecy which he has with a clandestine harlot—there is less of the confessedly commercial element in the transaction, it partakes more of the charm of seduction. He loves to deceive himself with the thought that the woman is not absolutely common, that not every comer can obtain the favors which are granted him, that he possesses a charm that compels a yielding of the feminine nature. Of course, everybody else knows that this view is vain in every sense of the word. That which here is most pertinent to this discussion is that the spread of venereal disease is, proportionately to their number, the same among the registered and the clandestines.

All of this leads to the inevitable conclusion, that it is impossible to guarantee safety from venereal to the patron of harlotry. As saith the scripture, "A whore is a deep ditch and a narrow pit."

In spite of all these facts, it is common to hear regulation advocated as a remedy for the evils of prostitution by the uninformed, not only among non-medical men, but even within our profession. Without making any careful study of the numerous trials of the method, captivated by the thought of easy control by legal enactment, they give this often exploited and thoroughly discredited system their enthusiastic support, and, with facile confidence in the soundness of their views, apply epithets of contemptuous characterization to those who, knowing the teachings of much history in this matter, venture to expose the fallacy of schemes of regulation.

ETIOLOGY OF PROSTITUTION.

If these much vaunted and long tried methods are useless, and worse than useless, are our resources at an end? Can nothing be done to abolish prostitution, or, at least, to diminish its deplorable effects? Are we to fold our hands in helplessness and try to ignore this curse? That surely is

not the attitude of the profession in other matters which concern it. Prostitution, often called The Social Evil, may well be regarded as a disease of the body social—an endemic of almost universal prevalence. Approaching it as is our established custom in dealing with disease, having made a diagnosis, we seek for the cause, and, having found it, we remove it, if possible.

The elements in the etiology of prostitution are somewhat numerous, but, for the most part, not difficult of detection. Foremost stands the natural desire of the male human being for sexual intercourse. If one is justified in ascribing motives to Nature, it may fairly be said that, in her anxiety to provide for the preservation of the race, she has oversexed mankind. From puberty onward the sexual appetite is so strongly evident in man that individual and public restraints are necessary to keep its manifestations within due bounds. Its mere existence is not deemed a sufficient warrant for its unlimited gratification; and society has prescribed conditions for its legitimate exercise.

This element does not obtain to a very large extent in the case of females. There are but few Messalinas, hopeless sexual perverts; the vast majority of women have no very pronounced physical sexual feelings; and a minority are altogether deficient in this respect. But, while woman does not have to fight as much as man against appetite, other things are operative in leading her into the paths of vice. Poverty, ignorance of a useful occupation, inability to get an honest living, insufficiency of wages to afford decent support, the herding of large families in small tenements so that the sexes are brought into physical intimacy as abominable as it is inevitable, evil training and immoral associates, overweening love of dress and display, the attractions of a life of indolence, seduction effected through representations of its harmlessness or through promise of marriage—these are prominent factors in supplying recruits to the ranks

of prostitution. But more potent than any and all of these is ignorance of the laws of being, and of the ethical principles which ought to guide conduct.

Until all the vicious tendencies inherent in human nature are eradicated, we cannot expect to see prostitution entirely abolished; and hence it is practically certain that the diseases, which it is so largely instrumental in disseminating, will continue to exist to some extent; but the dispelling of the ignorance, by which prostitution is mainly fostered, will result in such a diminution of the lamentable practice that cases of these maladies will become relatively infrequent, obviously to the social and economic benefit of the race.

THE RATIONAL TREATMENT OF PROSTITUTION.

Education, then, is the principal remedy for the disease, since ignorance is the principal cause; and this education should be primarily physiologic, especially as regards the function of reproduction. When should it begin? Just as soon as the child shows interest in the subject! Probably this will be on the advent of a new member of the family. "Where did the baby come from?" The answer usually given is as silly as it is untruthful, and full of evil influence on the future of the innocent inquirer. All the wretched fables that do duty on such occasions will soon be detected by the child, and from that moment he will have no faith in the word of his deceivers. He sees that he has encountered a most attractive mystery, and he is bound to solve it. His curiosity is immensely excited by the attitude of his parents. Receiving no aid from those whose duty it is to help him, he goes elsewhere, and gets something that passes for information, but is distorted by vicious purposes and stained with the filthy slime of the gutter. A very serious phase of the matter is that the confidence which the child should have in his parents is destroyed by their contemptible lying.

Suppose that the parents recognize the question as not

only unobjectionable, but highly commendable, inasmuch as it concerns functions, ignorance of which is responsible for incalculable mischief, and tell him the truth. What harm can result from his learning that the baby came from its mother's body, in which it had been growing a long time? There is nothing indecent or obscene in the fact; there can be nothing objectionable in its plain statement. And there is very great advantage in this frankness—the child, instead of being crushed by a deceitful rebuff, is honored by being taken into his parents' confidence; no mystery is made of the process which is a common-place incident, and, consequently, there is little probability of his giving too much thought to it. He is told that it is not best to talk outside about such matters, for it is the affair of the family only; and this gives him a feeling of dignity and fellowship, which draws him into nearer and dearer relation to those who should be his best and closest friends.

As puberty approaches with its vague and disturbing feelings and thoughts, its physical and psychic changes, the father should tell his son, the mother her daughter, the meaning of the new functions, which are developing; and, thus, events which otherwise are likely to produce profound perturbation, are anticipated and explained, and the crisis is passed without alarm or trouble. That is the fitting time for warnings about the temptations to which both boys and girls are exposed, for instruction concerning practices which are productive of life-long shame, disease, and disaster.

SEXUAL CONTINENCE.

Then, too, may well be corrected the popular error that sexual intercourse is a hygienic necessity. That this opinion is sincerely entertained by many persons is illustrated by the case of the wealthy lady, of whom I have heard, who was making a solicitous search for a nice, healthy girl to serve as mistress for her son, who had just reached the age of puberty. Granted the premise that sexual intercourse

is essential to health, the woman's position was strictly logical—it was her maternal duty to provide means for the exercise of her son's procreative function in such a manner as would prevent his contracting any contagious disease. The bearing of such an arrangement upon the life of the other young person concerned is too obvious to require extended comment at this juncture. The belief in copulation as a health-measure probably had its origin in the desire to place the onus of immoral acts upon other than the real reason, which is lust. At all events, it is utterly mistaken. If a man has been accustomed for a long time to unrestricted indulgence of his sexual appetite, he has put himself into an abnormal condition, not properly to be taken as a standard. His state is comparable with that of a person who has contracted the alcohol-habit, or any other drug-addiction—deprivation is torture, and gratification, by giving a sense of comfort, conveys the impression of being requisite for well-being. To a man, however, who has not thus misdirected his sexual functions, who pursues a normal physical course, and who keeps his mind free from lewd imaginings, complete abstention is not only free from harm, but even beneficial. Perfect continence is a requisite in the training for severe athletic trials; and the internal secretion of the testes, which is so essential for the development of the adolescent into real manhood, can hardly be supposed to be valueless in subsequent years. All the great authorities are in agreement on this point, that abstention hurts no normal man. Finally, it may be set down as certain that, next to education, the best safeguard against sexual vice is association with chaste and refined women.

Later, when maturity is near, the young people should be advised concerning the marriage-state, and instructed to the following effect:

Marriage between persons whose physical or mental contion is markedly imperfect should be discouraged, for manifest reasons.

Marriage should not be regarded as a state in which prostitution is legalized. That it is so considered by men generally is undeniable. The physical element in love, whether avowed or denied, is prominent in the thought of the male, and he is usually insistent upon his so-called rights. Commonly his exactions are granted by the female, but without real comprehension of them, and with a toleration which comes from a sense of duty or of policy; but a relation, which is characterized by brutal demands on the one side and helpless submission on the other, is very far from ideal.

THE SANCTITY OF LIFE.

The rights of the prospective offspring and the responsibilities of their parents are entitled to most solemn contemplation. In some ways we display a wonderful regard for life. For example, a man is found dead, evidently slain in cold blood. He is a notorious malefactor, guilty of a multitude of heinous offences, absolutely devoid of the qualities which make for good citizenship, an active pest to society. And yet, although everybody who knows about him is avowedly glad of his death, and believes that the safety of the community is enhanced by it, all the necessary machinery of the law is immediately put in motion to bring his murderer to punishment. Detectives search every possible place of concealment; a reward is offered for his apprehension; when captured he is scrupulously guarded against possible injury from an excited populace; at his trial the State furnishes him with a learned advocate, and pays the cost of his witnesses; on conviction he is given a long period for repentance and preparation for eternal residence in paradise; and, finally, he is deprived of earthly existence by a merciful and expensive process. Many thousands of dollars are lavished on the case, and people eagerly read the details of the affair as a matter of vital importance. Outraged society has demonstrated that no member, however low, bad, and objectionable, can be deprived of his life with

impunity—that even if that life has been utterly misused, is entirely unfit for continuance, and even a menace to every other life in its neighborhood, it must not wantonly be cut short, and, if so destroyed, shall be avenged.

Such insistence on the sacredness of life is eminently proper; but does not consistency demand that this sanctity should be recognized in some other way than by safeguarding life and punishing those who recklessly disregard its rights? Should we not consider life so sacred that it should not be bestowed unworthily, that it should not be begun except in conditions favorable to its development into a blessing, and not a curse to its possessor and to society? If the beginning of life was more regarded, there would be fewer cases of its vicious and violent ending. When the things which are already well known about the physiology of generation duly impress the public mind, then will the people cease to limit their consideration of the sanctity of human life to the circumstances attending its cessation; then will they perceive that an even greater responsibility waits upon the performance of the acts which determine the inauguration of life; then will they wonder that a function, so prodigious in its bearings, so almost infinite in the extent of its influence, ever should have been regarded by persons esteemed thoughtful and humane as a triviality, a subject for ribald jesting, a thing obscene, indecent, and shameful; then will they appreciate the truth that the beginnings of life are so sacred that no statement can exaggerate their holiness, no preparation of body and mind be too perfect for the function installing them.

The progeny should not be unintended, or begotten when the parents are in other than favorable condition. Every child has a right to an inheritance of good physical and mental health, and is unlikely to have it, if he is conceived when his father and mother are feeble or depressed in mind or body; every pregnancy should be a cause of re-

joicing to all concerned; and then the little one will have a warm welcome ready for him, and the prospect of a felicitous disposition.

THE BEST SIZE OF A FAMILY.

If the married are careful to observe the rules already given, they will probably have no need of advice as to the size of their family—the good sense which has guided them in the other things will dominate their conduct in this. But so much has been said of late on this subject that it may pertinently be touched upon here.

We have heard a great deal about so-called "race-suicide," the implication always being that citizens owe it to the state to have large families. The leading apostle of this doctrine speaks with the confidence of one having authority, and not as the scribes. But prodigious personal popularity and exuberant willingness to criticise and advise on every subject within the entire range of human knowledge and speculation are not invariably associated with encyclopedic information and judicial cast of mind; and, at the risk of violent denunciation, one may venture to suggest that another opinion is worthy of entertainment. Both science and philosophy have arrived at the opposite conclusion. Quality is much more desirable than quantity; indeed, the latter may be expected to diminish the former. As a rule, the highest physical types occur in the smallest families. Prof. Franz Boaz, of Columbia University, has plainly shown that improvement of physical development attends reduction in the size of families. "In other words, nature seems to be subtly protesting against overbreeding by stunting the growth of superfluous children."

Herbert Spencer, the greatest of philosophers, says:* "Further evolution, causing along with higher nature diminished fertility, and, therefore, smaller burdens on parents, may be expected to bring a state in which, far more

* The Principles of Ethics.

than now, the pleasures of adult life will consist in raising offspring to perfection, while simultaneously furthering the immediate happiness of offspring."

"Only as fast as fertility diminishes, which we have seen it must do along with further mental development, can there go on such diminution of the labors required for efficiently supporting self and family, that they will not constitute a displeasurable tax on the energies."

In addition to the injury to parents and children, when the latter are too numerous, the augmentation of a family beyond the capacity of the parents properly to support and train imposes an unwarrantable burden upon those in the community who are more honest and provident, and sufficiently high-minded to deny themselves indulgences to which their sense of right and justice objects. The intentional limitation of offspring within the bounds of suitable maintenance is a duty alike to the progeny and the community.

Doubtless members of reigning families in monarchies are impressed with the obligation to pay the price of their royalty in part, at least, by keeping the strain in existence, and the same may be true of other titled personages; but I am not aware that I have encountered a man who could truthfully say that he had begotten his children in response to a prompting of duty to society. Many men desire offspring, from love of children, from an ambition to perpetuate their name, from a wish for heirs to their estate; many, without any definite wish for them, accept what come with patience, and find that toleration develops into affectionate enjoyment; many, unfortunately it must be said, regret the advent of the new comers, and treat them as if they were unjustified intruders, viciously thrusting themselves into an already overburdened family; and all of these parents—those who welcome their progency with delight, those who have to become reconciled to what was originally an unhappy fate, and those who always abominate their self-

imposed burden—on occasion accept the plaudits of certain pseudo-philosophers for their activity in performing their duty as good citizens, and not infrequently swagger a little in complacent contemplation of their superiority to their childless associates. It may well be doubted, however, if any one of them had in mind for an instant a duty to the State in contracting marriage or in performing any act in that relation subsequently. It is not altogether pleasing to think, as we must, that most of us are accidents; to recognize the unquestionable fact that men, who are scrupulously careful about the breeding of their dogs, their horses, their swine, their barn-yard fowl, are absolutely careless about the generation of their own kind. Reason guides in all the other cases, and passion in the one, which is of infinitely more importance. That a citizen has a duty to the community in the matter of offspring is perfectly plain, but it does not lie merely or mostly in the direction of numbers. He may, as Spencer remarks, "fitly discharge his indebtedness in some other way than by adding to the population." President Hall, of Clark University, says in a recent article, "Many intelligent people, whose constitutions are tainted or handicapped by disease, deliberately refuse to produce children upon whom it can be entailed. This is a species of intellectual and moral heroism as splendid as anything exploited in ancient song and story."

However earnestly one wishes his own country to become great in population, it is futile for him to urge his fellow citizens to consider it a duty to the State to beget a numerous offspring. Some governments have tried the experiment of offering a prize for every child in a family above a stated number; but the effect is the rewarding of improvidence, and putting a premium on the production of individuals, who are more likely to be a burden than a help to the nation. It is entirely safe to say that no honest and sensible man is actuated by the hope of pecuniary gain in

adding to his family—the prize does not compensate for the increase of the expense of rearing the brood. It is well known that the feeble-minded are generally very prolific; but their contributions to the population markedly diminish the strength of the society. *Homarus americanus* has a hundred thousand offspring a year, but nobody wishes to be classed with the lobster.

But there are those who preach the doctrine of great families, not as a duty to the State, but on what they consider higher grounds. They declare that so-called "race-suicide defeats the purpose of creation, which is to reap a crop of souls for heaven." * Such teleological perception, such acquaintance with the intents of omniscience and omnipotence, so far transcend any knowledge of mine that I must confess my incompetence to discuss the matter from that point of view.

HOW SEX-EDUCATION SHOULD BE GIVEN.

The teachers of the children should be their parents, and we, the trusted physicians, should teach those parents. Not only this, but we owe it to the community to insist upon the importance, the essentiality, of this instruction. Our profession, as a whole, has too long neglected this great duty. Some, indeed, have recognized and have done it; and, in saying the things that I do in this hall, dedicated to and bearing the name of one of your greatest and best beloved physicians, a man of saintly character as well as exalted attainments, I feel that my words are spoken in singularly appropriate surroundings, that I breathe an atmosphere of sympathy and encouragement; and, if it is permitted to the spirits of the dead to revisit the scenes of their earthly endeavors, I believe that the purpose, at least, of this lec-

* Quoted from an address by Father Isidore in Holy Name Cathedral in Chicago, 10 March, 1910. Bishop Canevin, in a letter to priests of the Pittsburg diocese, Feb., 1910, recommends early marriage, says that the primary end of marriage is that children may be born and educated, and speaks of the right of children to be born.

ture is receiving the benediction of the pure minded and philanthropic John Ware. "In 1847-48 many meetings were held in Boston to consider what means might be employed to lessen immorality and promote the well-being of the young. A committee was appointed to cause a book to be prepared, which should deter from vice by a just exposition of its nature, its dangers, and its effects," * and Dr. Ware was requested to write it. How well he succeeded may be judged from the estimate put upon it by the committee, who pronounced it "accurate, clear and truthful, but never offensive to modesty, nor suggestive of evil thoughts." In the card-catalogue of the great library in this beautiful building are listed a number of articles by Dr. Ware; but it is safe to say that no one of them has attracted anything like the attention given to this little book, which passed through many editions, and stands as a monument to his virtue and his aspirations for the race.

Doubtless many medical men since that time have lived up to these principles; and, to show that this line of thought is still followed, I will quote a few passages from a very recent paper by one of your most honored and distinguished physicians, Dr. James J. Putnam. In his very valuable article on "Personal Impressions of Sigmund Freud and his Work," † he says:

"Most of these criticisms have centered really, whether the fact was admitted or concealed, on the prominence given by Freud to the sexual element in the causation of the psychoneuroses. This was considered as a disagreeable topic, on which we had closed our eyes so long that we thought we might permit ourselves to regard it as legitimately outlawed. Its vast literature—well known to be of great importance—was repulsive, and should not be seen upon our shelves. It counted for but little that this immense subject was daily and hourly thrusting itself upon our notice, whether as the

* Quoted from the preface of "The True Relation of the Sexes."
† Journal of Abnormal Psychology, Feb.–March, 1910.

cause of terrible sufferings, of terrible crimes, of terrible misunderstandings and misjudgments, and that it has played a huge part in the history of religion and of civic progress; those who have ventured to study it scientifically have been, nevertheless, regarded widely as disturbers of the peace."

"The principle objection to the discussion of sex questions, or the prejudice against it, rests on the assumption that 'sexual' means 'sensual.'"

"Conventional morals, important as they are, as indicating standards towards which everyone should, for certain reasons, strive, are often, in a wider sense, extremely narrow."

It is extraordinary that such aversion to the mention of matters sexual should obtain in a land which is invariably reckoned as Christian, in which, indeed, the great bulk of the people are considered and wish to be considered Protestant Christians, belonging to that ecclesiastic division that bases its belief upon the authority of the Bible; for this holy volume, translated into more languages and distributed more widely than any other in the whole world, assiduously kept before the community by the churches, and pressed upon the attention of the people by great organizations, whose sole purpose is its universal dissemination, treats affairs of sex in the frankest and most matter-of-course way. The organs of generation, the function of reproduction, the most intimate physical relations of men and women, the permitted and forbidden circumstances of sexual conduct, are all mentioned with a freedom which is surpassed in no book, which is much esteemed, excepting that other great oriental work, the Arabian Nights' Entertainments—the most marvelous and fascinating collection of romantic literature on earth—and not in this in the expurgated versions most commonly known. From beginning to end the Bible unreservedly touches sexual subjects; and so marked is this

fact that such a study of it as one would reasonably expect by those to whom it is constantly recommended as the most valuable and important book ever written, containing the profoundest wisdom, the most uplifting sentiments, the infallible code of ethics, and the surest guide to immortal bliss, would so inevitably accustom them to familiar mention of everything relating to the processes of reproduction that there would be no shrinking from plain and necessary treatment of the subject. But everybody knows that this is not the case. The explanation must be found in the dense ignorance of the people concerning this great book. If they read it in any but the most perfunctory manner; if they attempted seriously to justify to their own minds the supreme place in their reverence, which they unhesitatingly accord it; if they manifested in it anything approaching the interest that they show for the best-seller among the trashy novels of the day, the result would be that they would not be shocked by the discussion of the vastly important questions, in which the relations of the sexes are involved; for some knowledge of the generative functions would be so widely diffused that the education of the people which I advocate would be well begun. But to all but a minute minority the Bible is little, if anything; but a fetich—revered, kept in a place of honor, held to be a necessary part of the furnishings of a house, a talisman, a protection against evil spirits, a ticket to a reserved seat in the sempiternal choir, a fire-insurance policy on the soul. Parents give their children the Bible, with the injunction, expressed or implied, to read and study it. Can such persons reasonably object to having their children given frank, pure, and intelligible information about the functions on which the perpetuation of the species depends, whose abuse and perversions are responsible for a large part of the miseries of the race? The objection could not consistently be made by any man, whether Catholic or Protestant, who believes that he is made in the

image of the God which he worships, for he can find no warrant for the idea that the resemblance embraces all other parts and stops short at the reproductive; but, on the contrary, he cannot fail to remember that his belief includes the acceptance of a begotten son of God.

The clergy is far from blameless in this matter, in that they avoid dealing in any way with the subjects here discussed. How refreshing it would be to hear from prominent pulpits sermons on such texts as the following:

"There is fornication among you." 1 Cor. 5, 1.

It is the "will of God that ye should abstain from fornication." 1 Thess. 4, 3.

"Nor shall a fornicator inherit the kingdom of God." 1 Cor. 6, 9.

"The man that committeth adultery, even he that committeth adultery, shall surely be put to death." Lev. 20, 10.

"Whoso committeth adultery lacketh understanding." Prov. 23, 27.

"When any man hath a running issue out of his flesh, because of his issue he is unclean." Levi. 15, 2.

On the other hand the public almost universally shows in an unmistakable way that it has a salacious taste whenever a scandal involving sexual performances becomes the subject of judicial investigation. Pious, Christian parents, who think it outrageously indelicate that anyone should suggest instructing their children along lines necessary for the latter's protection from immorality, disease, and death, devour with feverish eagerness all the shocking details of the lewd performances of a low and worthless creature, who has lifted himself out of utter insignificance by the magnitude of his crimes. Day by day for months they greedily seize upon the newspapers, which present in ghastly minuteness tales of filthy vice, which can have only a demoralizing influence upon the community; and these family-

journals grace the homes of the righteous, and become potent factors in the education of their children.

TREATMENT OF SEXUAL CRIMES.

Even if we could banish every particle of the ignorance of the laws of life, which enters so largely into the etiology of prostitution, there would still remain other causes demanding attention. These, however, are not technically within the domain of the physician, and are properly left to the care of the moralist, the philanthropist, the sociologist, and the economist.

But, while every available agency is employed to the uttermost in the effort to right the wrong, the trouble remains, and cannot be ignored. Even when the physician knows the source of a malady, and is working wisely for its suppression, it is necessary to do something for the temporary relief of the patient. The body social is suffering with the disease called prostitution. The removal of the conditions causing it can be effected but slowly, and meantime active treatment is called for.

There are at present many laws against sexual crimes; but an element of weakness in some of them is the disproportion between the penalty and the offence, in some cases a major infraction bringing a light sentence, while a comparatively trivial one is severely punished. It is merely another instance of the inconsistency and unreasonableness of the usual attitude to matters sexual. Take, for example, the case of the poetic genius who brought obloquy upon himself, and a sudden and disgraceful end to a brilliant career by his perpetration of a crime so abominable as to excite universal disgust. If he had seduced an ignorant and trusting maiden, or laid himself liable under the bastardy act, or been co-respondent in a suit for divorce, he might still have been admitted to the houses of the great and opulent, and have continued to be the pet of lovers of poesy, the drama, and astounding eccentricity. Apparently the

blasting of an innocent young life, the imposition upon the community of an illegitimate child, and the invasion and destruction of a previously happy home are offences easily to be condoned; but a sexual act, which does none of these things, and affects only the two participants, is worthy of years of incarceration at hard and ignoble labor, and heart-breaking ostracism for life! The man was clearly a sexual pervert, and his act, revolting and filthy as it must seem to any normal mind, recalling the vices of Sodom and Gomorrah, bears no comparison with those with which it is contrasted, either in its physical, moral, or social effects.

There is a great lack of appreciation of the relativity of sexual crimes on our statute-books, and a careful revision on lines of sense and justice is much needed. But public sentiment should not be content to let this class of offences go unrebuked, as they commonly are now; it should open its eyes to the fact that adultery cannot be committed by one person only, and that the two who are always concerned in it are equally deserving of the penalty. If the public and the officers of the law were to take this view of such cases, and the same vigilance were to be manifested in bringing them to justice as is exercised in the enforcement of some laws of less importance, prostitution would receive a staggering blow.

A peculiar phase of this subject has recently attracted the attention of our national government, and the Congress has published the report of a commission of investigation,* from which I quote a few sentences. "The importation of women for immoral purposes has brought into the country evils worse than those of prostitution. In many cases the professionals who come here have been practically driven from their lives of shame in Europe on account of their loathsome diseases, the conditions of vice obtaining there have even lowered the standard of degradation of prostitu-

* Senate document No. 196, 61st Congress, Second Session.

tion formerly customary here." "Both from the investigations of the commission and those of the Bureau of Immigration, it is clear that there is a beginning, at any rate, of a traffic in boys and men for immoral purposes."

But this importation of women is not the worst crime which has lately been disclosed. "The recent examination of more than 200 'white slaves' by the officers of the U. S. District Attorney at Chicago has brought to light the fact that literally thousands of innocent girls from the country districts are every year entrapped into a life of hopeless degradation and slavery, because parents in the country do not understand conditions as they exist, and how to protect their daughters from the 'white slave' traders, who have reduced the art of ruining young girls to a national and international system." "The radical remedy is in the home. Every mother should teach her daughter the mystery of life. Ignorance is a poor protector of innocence." *

Nobody can escape the conviction that it is the clear duty of every citizen to give all possible assistance to the officers of the law in their efforts to exterminate this awful abomination.

In advocating the instruction of children by their parents, and of parents by physicians, I have assumed that our profession is already qualified for this important service. To speak with perfect frankness, however, it must be admitted that this assumption is not entirely correct—the profession itself needs education in this direction. The avoidance of the scientific discussion of sex matters has become a fixed habit, and cannot be readily overcome. But, stupendous as is this whole task of education, it should not appal. It must be undertaken, and neglect to do our part will count to our everlasting discredit.

* Edwin A. Sims, U. S. Dist. Att'y of Chicago, quoted in the *Outlook*, March, 1910.

A CAMPAIGN OF EDUCATION.

The first campaign of the crusade, then, must be entirely educational. Already organizations have been formed for this specific purpose; but, in my judgment, they are not destined to accomplish as much as could be done through a different agency. The profession and the public are much more likely to be influenced in the desired direction, if the instruction is offered by a great society, which is long established and widely known and honored, conducted by famous men, powerfully equipped in personnel, in traditions of the best methods, in a record of large achievements, and in financial resources. A committee of such a society, composed of earnest, well-poised, altruistic men, who are interested in the work, would first assemble the forces of the several associations committed to this service, and unify and coördinate their various activities, so that no effort would be lost by a duplication of work. Then a scheme would be adopted for reaching the public through the press. The newspaper syndicates afford the most accessible paths to the desired audience. A single one of these supplies material to 4700 weekly journals, which reach, according to a conservative estimate, three million readers every fortnight. A short article would be furnished to each syndicate every week; and a paper by some distinguished author once a year to each of the great monthly magazines of general scope. Nothing, of course, would be published that was not strictly true, properly stated, and entirely free from tinge of sensationalism, for every word would have the sanction of the central authority.

Some one may ask if the public would favor or even endure such a series of articles. The answer is found in the demonstration that has already been sufficiently made. For example, a certain high-toned journal, designed expressly for the reading of women, and with a circulation of a million a month, has had more than one temperate, but plain-spoken

article on these topics, and this is not a solitary example. The people are more than ready for whatever we have to tell them along these lines. Approval of this method is already given by the Boston Medical and Surgical Journal, whose utterances we all admit are *ex cathedra*, in a recent editorial, commending an article on "preventable blindness" in McClure's, saying, "It is an example of the way in which the modern magazine may be made the vehicle for disseminating among the people the kind of information which they should and must have before they can reasonably be expected to coöperate in great measures of public progress, measures for which we cannot hope success without such coöperation."

The profession would be reached to some extent by these papers and magazines; but it should be more particularly approached through the medical journals by means of signed articles from the recognized authorities. There is needed an incessant, tireless presentation of the subject, so long continued that the densest intellect will be penetrated, the dullest mind awakened, the most obstinate objector convinced.

SYPHILIS AND GONORRHEA SHOULD BE REPORTED.

In a year or two legislation would be sought and obtained. At first, it would probably be politic to ask only for the compulsory reporting of cases of syphilis in its contagious stages, and of gonorrhea, thus putting them on the plane of other communicable diseases. The profession knows that this is the correct course to pursue; that logic, consistency, duty as guardians of the public health demand it. In New York city, in 1900, there were reported 41,145 cases of tuberculosis, scarlatina, measles, diphtheria, variola, and varicella; and the venereal morbidity, estimated conservatively, was 225,000. If that is thought too high, quarter it, and the result gives 15,000 more than the six other diseases; divide it by five and there is still a

large excess of venereal. Syphilis and gonorrhea should be reported for exactly the same reason that the other infectious diseases are reported—because society has a right to protection from them. The fact that they are contracted so largely in the commission of acts, which are not only immoral, but forbidden by law, is not only not a reason for concealing them, but an added reason for exposing them. In what other case is it ever alleged, as an extenuating condition, that infraction of law is an essential element in the offense? Syphilis and gonorrhea are acquired either innocently or in the pursuit of vicious indulgence. If innocently, the reporting should bring no shame; if viciously, the victim is estopped from demanding that measure of sympathy to which the burden of grave disease ordinarily entitles him; and the community has a right—it is its duty—to protect itself against his communicating his horrible malady to others. You and I, and those whom we hold most dear, are more worthy of protection than is the sensualist, whose moral perception is so blunted that he insists that we should suffer and die, rather than that he should endure any curtailment of his iniquitous pleasures, or should incur the odium which his criminal conduct merits.

These views are opposed on various grounds, and the arguments against them will be met and answered.

It is objected that a law should be the expression of the deliberate will of the majority, and that the proposed statute is not called for. To this it is answered that, if the law-makers did nothing except in response to popular demand, the general court would have but little to do. There was no such clamor for the establishment of your State Board of Health, the first in the country. A few sagacious and philanthropic men—a minute minority of the population, and almost the only persons in it who had a grounding of sanitary knowledge—persuaded the legislature of the value of the proposed statute, which proved to be of in-

estimable worth, especially in educating the people. There are countless cases in which the populace has derided, vilified, abused, and injured men of advanced views, who have proposed wise schemes, which long afterward were adopted to the great advantage of the community. It is hardly thinkable that, if people generally knew, as they should know, of the perils of syphilis and gonorrhea they would not insist upon the suggested addition to the law.

A second objection asserts that the law would be useless, because, it is said, physicians would not report their cases. Doubtless this would be largely the fact at first, as it was with tuberculosis, and still is to some extent; but gradually the wisdom and necessity of the practice would penetrate and pervade the understanding, and compliance would become habitual.

Next, it is asserted that a law unenforced has an evil influence on the public regard for all law. It is true that a law needs the approval of a good part of the community in order to be thoroughly effective; but it does not follow that it is useless or harmful, if it is not generally approved. The lack of sympathy may be due to failure of appreciation; and, if the law is sound, approval will grow just as comprehension enlarges. But, more than this, there is a distinct value in the legal recognition, for every law is largely educational; it reminds the people of matters previously unconsidered; and, because it is a law, it comes to them with a predilection in its favor. As was said by your eminent fellow, Dr. Arthur T. Cabot, at last year's meeting of the National Association for the Study and Prevention of Tuberculosis, "There can be no doubt that legislation looking to hygienic living had much to do with the decrease in tuberculosis which preceded the modern understanding of the disease, and the crusade against it." "The laws [are] often evaded." "Their full usefulness will not be reached until the public recognizes their necessity, and demands

their enforcement." "This enforcement, then, waits upon the education of the community." What is said here about tuberculosis applies equally to syphilis and gonorrhea. The law should require the reporting by householders, who know about cases in their families, and by all persons undertaking to treat these diseases, thus reaching charlatans and prescribing apothecaries.

It is, of course, objected that the code of ethics forbids the revelation of facts obtained in the privacy of the consulting-room. To which it may fittingly be replied that a code, which prescribes protection of the guilty at the cost of the health and life of the innocent, conspicuously requires revision. Our profession as a whole has too long given its tacit sanction to deeds which excite in its individual members abhorrence. We have permitted base men to take advantage of the provisions of our code and of our exaggerated and perverted notions of honor, to shield themselves from the deserved consequences of their shameful acts. The adulterer has counted confidently on the gravelike silence of the physician, to whom he brings his case of venereal, knowing that, however base the relation which he purposes to sustain toward his trusting spouse, however reckless concerning the welfare of his possible progeny, and however frank in his expression of brutality in both these regards, the doctor may be depended upon to shield him by giving no warning to the party who is in such peril of wreck and disgrace. There certainly should be some way by which we can avoid becoming involuntary accomplices in crime,—it should be impossible for any breaker of statute or social law to make us protectors of evil doers, particularly when, by such guardianship, we fail so strikingly in the foremost and most valuable of our functions—the prevention of disease.

How inconsistent is our attitude! A man suspected of leprosy, although pronounced by the highest authority on

dermatologic matters to be free from the disease, is branded as a social outcast, subjected to constant inconvenience, discomfort, and pecuniary loss, and deprived of his liberty for a long period, and all this in spite of the apparently well-grounded opinion of some experts that the malady is not contagious. Such a case is fresh in your minds. But a man in the acute stage of gonorrhea or syphilis, or even both of them, is allowed to roam without restriction among the people, possibly leaving his vile trail on every article and every person with whom he comes in contact, spreading the contagion of the most formidable diseases broadcast, and no one of us utters a word of protest, except such as we speak into his regardless ears; no one is justified by the code in putting the richly merited "Cave canem" upon him for all to read.

But we are asked if we should not be as closemouthed as priests, who never reveal the secrets of the confessional. The cases are essentially different. A sinner confesses his misdeeds to a priest in order to obtain absolution, without which he does not expect to gain admission to paradise. Confession is a sacrament, enjoined in order that a guilty one, by acknowledging his offense, expressing repentance, and avowing intention to avoid the sin in the future, may be forgiven by the earthly representative of the deity. The church insists that the father confessor shall keep inviolable the disclosure that is made to him, because, without confident assurance to that effect, the sinner might avoid confession, and thus, receiving no official forgiveness, would be in great danger of eternal damnation. It becomes to him a question between a chance of punishment while in the flesh, and a far worse experience after death. The law sympathizes with the intent of the church, and tolerates the sacerdotal attitude of silence.

When one goes to a physician, he seeks physical help. The intelligent patient reveals everything that he knows

about his case to assist in the formation of a diagnosis; and he is aware that, if he is found to have certain diseases, the doctor is compelled by law to report the existence and nature of his case to the authorities, so that there may be no unnecessary diffusion of the malady. Naturally one prefers to have no publicity given to the fact of his ailment; but when a man comprehends the purpose of the law, when he appreciates that unless he sacrifices something of convenience, comfort, and material good, his family, his neighbors, his town may suffer great loss in sickness and death, he yields obedience to these sane regulations. Thus, the patient knowing that the law requires syphilis and gonorrhea to be reported to the board of health, the medical man is guilty of no breach of confidence in disclosing the character of the disease.

When the community has been educated to a proper appreciation of syphilis and gonorrhea, further legislation should be had, especially forbidding the marriage of persons in whom the diseases remain uncured; the making it a crime to communicate either of them; and the authorizing of a civil action in cases where a party who has been infected brings suit for damages.

How utopian this whole scheme seems to many of you I fully appreciate, for I have been arguing along this line for a third of a century, and know that these views are not congruous with prevailing ideas and sentiments; but I am so thoroughly convinced of their correctness and of their ultimate adoption that I am content to leave the matter without further argument. Nothing that I have said is intended, or can be fairly interpreted, for the belittlement of any movement already undertaken for the stamping out of any disease. Our profession is capable of fighting many foes at once; and without diminishing the interest in any one of its campaigns, it can, and sooner or later certainly will, enlist heartily in the proposed crusade against syphilis and gonorrhea.

ARTICLE XXXVII.

WHAT IS THE EXPERIMENTAL BASIS FOR VACCINE THERAPY?

By THEOBALD SMITH, M.D.
OF JAMAICA PLAIN.

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WHAT IS THE EXPERIMENTAL BASIS FOR VACCINE THERAPY?

THE historical development of the use of vaccines as defences in the struggle of man against infectious diseases may be considered as fairly well known. The observation made in early stages of civilization that one attack protects more or less securely against a following attack led the way to the practice of inducing mild cases by exposure and inoculation to prevent more severe ones later. Small-pox inoculation, practised up to the beginning of the 19th century, gave way to cow-pox as a safer and easier way of acquiring immunity against small-pox. The many-sided life work of Pasteur was in his later years limited almost wholly to the practical application of the biological law that a mild attack of an infectious disease usually protects against a subsequent one. He devoted most of his time to the working out of methods of reducing the virulence of animal-disease germs so that they might safely be used to produce a mild type of disease which was to fortify the animal when continually surrounded by infection later on.

In 1885 Pasteur introduced a new idea in the use of antirabic vaccination after infection. The immunity was to be rapidly induced after the human being had been bitten by a rabid animal, not before. In 1890 Koch presented to the world his tuberculin as an aid in the cure of tuberculosis. Though at first misunderstood, the action of tuberculin is essentially protective or immunizing rather than curative.

In 1902 A. E. Wright took still another step in advance in advocating the inoculation of dead bacteria in various chronic affections due to these bacteria. So far as I am in-

formed Wright at first limited the application of his vaccines to chronic infections with well marked and usually external localization of the infectious processes.

Very recently the practice of injecting dead bacteria has been extended to more acute diseases like typhoid, even to a disease of such relatively short duration as pneumonia and to infections, in which a general systemic intoxication and even bacteriæmia exists.

This very brief sketch is significant in showing us the rapid march of events from vaccination before exposure to protect from any impending infection, to vaccination after exposure and even during the course of an acute disease.

Knowing how difficult it usually is to prove the efficacy of any therapeutic method owing to the fact that cases of disease, even those complicated with infectious organisms, are individualized and therefore not comparable, we naturally ask the question whether there are any demonstrated guiding principles derived from laboratory and allied experimental work to assist us in estimating the value of vaccine therapy. The statistical method so often invoked in clinical medicine is slow and dependent upon the accuracy with which all case details have been worked out and classified.

At the outset I may state that experimental medicine has very little to offer us which is of service in deciding upon the efficacy or harmfulness of vaccination during disease. The practising physician in coöperation with the clinical laboratory will have to work out his own salvation, and this can be done only with the aid of the most rigorous and painstaking methods which medical science can supply. Any other course is certain to lead astray.

In view of this situation I have very little of value to contribute to the discussion. There are, however, a few aspects which, though familiar, should not be lost sight of, and I shall briefly review these so far as they are the product of experiment rather than of observation.

Vaccine therapy or therapeutic vaccination is simply an offshoot of prophylactic vaccination. One shades insensibly into the other. The boundaries between what we call health and disease are clinically undefinable. In health we may harbor disease germs and we may be slightly infected without being aware of it. The principles underlying prophylactic vaccination are thus applicable to vaccine therapy.

Concerning the capacity of the individual to be protected by vaccination, at least for a time, against infectious diseases, there is no longer any reasonable doubt. All attacks of infectious disease, either artificial through vaccination, or spontaneous, lead to an immunity of longer or shorter duration. The occasional statement that certain infections predispose the individual to subsequent attacks may be true clinically but the predisposing factor in such diseases will probably in all cases be found to be of a mechanical or physiogical nature which interferes with the acquired immunity. The underlying generalization that all infectious diseases tend to raise the level of immunity of the individual after recovery is not invalidated by these apparent exceptions. Experimental medicine has supplied us with a large stock of information on this phase of the subject. The study of the great plagues of animal life and the suppression of them by vaccination has furnished the experimental basis for human preventive inoculation. Unfortunately the most effective methods devised to protect animals cannot be safely used on the human subject, because they are too heroic and might, occasionally, jeopardize life. Our methods must be so toned down as to fit the weakest and most susceptible. In animal life this is not necessary, for it is desirable that the weakest be eliminated and that it shall not propagate its kind.

Experiments on animals have taught us that immunity and susceptibility are purely relative terms. They are matters of more or less. Frequently these terms are used as if

they meant respectively the presence and absence of something which might be represented by the signs + and −. These latter conceptions are erroneous, for an immune animal simply possesses something more than a susceptible one, or perhaps a greater capacity for acquiring something more. Hence when we induce immunity it is simply to stimulate the body to a higher level of resistance to any given infection rather than to put into it something that was never there before.

Man possesses already a high degree of immunity towards most infectious diseases, for after exposure not all individuals are attacked, and even under unfavorable conditions only a small percentage succumb. A complete absence of immunity would signify that all exposed would contract a given disease and die. How far we are from any such situation is a matter of daily experience in medical practice.

When immunity is induced artificially it is raised by degrees. The animal that perhaps would have died very quickly without vaccination dies after a longer struggle. The one that might have succumbed to a chronic disease passes through a mild attack and recovers. Lastly, the one which would have had a mild attack does not become ill at all. It may be demonstrated experimentally that an animal made immune to a given fatal dose of bacteria inoculated into the subcutis, is still subsceptible when the same dose is injected into a serous cavity such as the peritoneal cavity, and least immune when the bacteria are introduced directly into the blood stream.

By repeated vaccination the animal which would have died of an acute septicæmic attack may become so highly immune as to be completely protected against illness after exposure or inoculation of a fatal dose. This is not always possible however, for the capacity of the animal to produce enough immune bodies may be limited individually as well as specifically, and no amount of treatment might avail in some cases.

By inducing immunity the type of disease may also be changed. In place of the septicæmic type, the blood infection disappears and the virus becomes localized on serous membranes, in joints or in certain organs or in the subcutis and skin. The more localized the process the higher the general immunity, which, as it were, crowds the invader into a corner. These modifications are producible at will in the laboratory and are no longer matters of dispute. A localized infection from the experimental point of view may thus mean one of two things. Either the individual possesses already a relatively high degree of resistance or else the microörganism is of such a low order of virulence that it makes no headway against an average resistance.

Immunity is more easily acquired or raised towards certain micoörganisms than towards others. Thus it is relatively easy to protect against small-pox, but I doubt that complete protection against tuberculosis would be easy. This difference is inherent in the physiology and chemistry of the bacterial cell. On the other hand certain individuals are more easily protected against infectious diseases by vaccination than others, probably because they start on a higher level. Let me illustrate. Certain individuals contract hemorrhagic types of infectious diseases,—small-pox for example,—and die early in the disease. This means usually great susceptibility rather than a high degree of virulence, because such cases are rare among types of ordinary severity in the same outbreak. Now if we should vaccinate such a person what would be the result? In the absence of any possibility to find out by actual trial, I venture to assume that such a person's immunity would be raised by ordinary vaccination only enough to escape the fatal disease. He would probably contract varioloid after exposure. In estimating the success of vaccination we often blame the vaccine for failures without taking into consideration the very low resistance of certain individuals. In the labora-

tory a small percentage of the animals used show a distinctly higher or lower capacity for immunization than the rest.

Another factor which must not be lost sight of is that of time in producing immunity. The rousing of protective machinery cannot be hurried. Each disease has its normal periods of incubation, of fever and of convalescence, to which there are, indeed, exceptions due to intercurrent causes. These periods are functions of sensitizing and immunizing processes. The so-called accelerated reactions brought out by repeated injections of tuberculin and repeated application of vaccine are due not to any greater promptness in the production of anti-bodies, but rather in their release or discharge, or else due to the interaction of vaccines with immune bodies already formed.

I have several times used the word anti-bodies as factors in immunity. It is well known that while the practical work of testing the efficiency of vaccines on man and animals has been going on in a more or less empirical, tentative manner, the analysis of the phenomena of infection and recovery has been going on in many laboratories, thanks to the impetus given by the discovery of antitoxin and by the establishment of laboratories supported by State and national resources.

Immunity has been shown to consist of a series of co-operating and interacting forces represented by antitoxins, bacteriolysins, opsonins, agglutinins and phagocytosis. The precise machinery which comes into play for any given microörganism or any given species of animal is probably not identical with that in use for any other microörganism or by any other host species. A complete explanation for the immunity which suppresses the invasion of any given organism, such as the plague or the tubercle bacillus, is not known. We know only details and fragments not easily pieced together. The discovery of the different anti-bodies

has not thus far been of much assistance in practically gauging the value of vaccines or making them more effective, if we except the measurement of the opsonic index as devised by A. E. Wright. The various anti-bodies however have been of very great service in diagnosis and each one has now been harnessed to certain special methods of recognizing specific diseases, blood, toxins, animal foods, etc.

Another point of great importance is the temporary loss of protective substances, *i. e.*, the lowering of the immunity level caused both by the disease and by vaccination. The lowering of the opsonic index after the injection of vaccines, of the antitoxic value of the blood in horses after injection of large doses of toxin, are illustrations of this condition. Each vaccination uses up some of the protective substances already present. It has been stated by several authors who have vaccinated calves against tuberculosis on a large scale that the treated animals are more predisposed to infection for a time after the injection of the vaccine.

Turning now to the application of vaccines where a diseased condition already exists, I have already stated that experimental medicine has not as yet cleared the way for a proper valuation of vaccine therapy. Few animal infections have heen treated with vaccines. Only very few human diseases are transmissible to animals, and although much work has been done on small animals with such viruses as typhoid and cholera, these diseases are not contracted by animals spontaneously and the results of experiments have only a limited application to human diseases, contracted in the natural way. Nor is there any encouraging outlook that in the near future experiment will take the place of bedside observation in this subject.

There are however a few theoretical considerations which may be of use in weighing the evidence for or against this kind of therapy.

At the beginning let us try to picture to ourselves as clearly as our present knowledge will permit the difference between prophylactic and therapeutic vaccination. If we inject into an animal once, twice, or oftener a given dose of living or dead bacteria, we find that this animal is protected against a subsequent inoculation which would have been fatal to an untreated animal. The vaccination has put the body in a state of preparedness, probably by increasing the supply of suitable anti-bodies. The few invading bacteria are easily overcome, destroyed, or else surrounded and gradually starved and asphyxiated. There is relatively little to do and the prepared state of the body has made the task easy. Now, let us suppose that the body was not so well prepared, not so prompt in closing in upon the invaders. They then begin to multiply, and when the body is roused a large number of bacteria are to be destroyed. A local process of inflammation and perhaps suppuration is the result. Suppose that the invasion extends beyond the place of entry and the bacteria are carried some distance to establish many foci of multiplication. We have then a systemic infection. The process might have been nipped in the bud by vaccination or preparedness.

Now the success attending vaccinal prophylaxis has carried it as a practice into the heart of disease. The wholly different situation between vaccination during health and vaccination in disease has not, I presume, always impressed itself on the enthusiastic vaccinator. In the one case only a few bacteria are to be checked and disposed of, in the other myriads, with a body largely robbed of its store of anti-bodies. When we consider how difficult it is to protect the body against the future invasion of many diseases, it would seem almost hopeless to do anything with a similar procedure after such diseases have taken a good start. We are in danger of taking the ounce of prevention and using it as a pound of cure. This it seems to me is the

situation as viewed from the experimental side. The presence of virulent living bacteria makes it seem absurd to add dead ones. Why is not the former stimulus enough?

In the case of chronic, localized affections in which vaccines have been much used, the justification for the use of vaccines is perhaps not so difficult as it seems. In the first place the body already possesses a high degree of resistance, otherwise the process would not be localized and suppressed elsewhere. The infection is located, perhaps walled off in the disease foci with imperfect and interrupted relation with the fluid that eventually receives and redistributes all immune bodies, the blood. Again the bacteria themselves may have acquired enough immunity to the anti-bodies that reach them to resist lysis or phagocytosis. The process halts, immune bodies are no longer produced because the stimulus is lacking. The injected bacteria are now capable of raising the immunity of the body fluids, first by becoming themselves destroyed and furnishing the necessary stimulus, and second by arousing where the injection has been made a larger territory of tissue to the production of anti-bodies. This bringing into play larger and larger areas of tissue I have used to explain certain phenomena in antitoxin immunity. If this view is correct the continual change of the point of application of vaccines would greatly add to the productivity of the tissues in immune bodies.

The production of more anti-bodies by the tissues under the influence of vaccines leads to a disturbance of the established equilibrium between the bacteria and surrounding tissues in the local disease processes and to sufficient reaction to effect a cure. Where the capacity of the body for producing anti-bodies is low or exhausted no cure can be hoped for. Surgical interference becomes here of the greatest value in opening up abscesses, incising indurated inflammatory foci, thereby giving freer access to the immune forces of the blood and causing auto-inoculation, *i. e.*, the escape of

bacteria and their products from the local process into the circulation and the establishment of other centres of antibody production.

The effectiveness of vaccines applied in the course of acute febrile diseases, such as typhoid fever and pneumonia, must be accounted for by principles of which experimental medicine has as yet no definite knowledge. The presence of fever is generally regarded as indicating bacterial activity with resulting toxæmia. Theoretically no advantage can be expected from adding more toxins. Perhaps, according to the theory I advanced, by bringing into action more cell territories outside the organs and tissues immediately affected, the disadvantages of the addition of toxin are outweighed by certain advantages.

The use of vaccines may be compatible with the existence of bacteria in the blood and internal organs whenever the infecting bacteria develop a high degree of parasitism with a low degree of toxicity. Under such conditions the bacteria are immune against the existing forces and the introduction, in vaccines, of bacteria more easily worked over by the body, may give the necessary impulse to a higher level of immunity. Or, the higher degree of parasitism may be associated with the usual toxicity but owing to the fact that the bacteria are relatively immune very little toxin is set free. Now, it might be interposed that under such conditions there is no reason why the blood should not sooner or later swarm with bacteria whose destruction would lead to dangerous toxæmia when the immunity becomes raised by vaccination. To meet this objection another hypothesis would have to be interposed, one which has occupied my attention more particularly in tuberculosis. If the bacteria are well protected against destruction they may at the same time be restricted in multiplication, for their protecting envelopes or capsules may interfere with multiplication.

These suggestions indicate how complex the mutual relation between the tissues of the host and the parasite may be. It behooves us therefore to be exceedingly careful in the use of vaccines and not to lean too heavily on the repeated statements made that vaccines do no harm. They have introduced a truly experimental factor into clinical medicine and surgery and no one should undertake their use in any but the superficial affections, who is unfamiliar with the principles of immunology, and incapable of utilizing and exploiting all that is now well established experimentally concerning immunity and susceptibility. Each specific disease, each bacterial localization to be treated, must be considered a problem by itself to which the experience gained in other types of infections may or may not be directly applicable. No vaccine should be administered simply because it produces an occasional drop in temperature and symptomatic improvement. Only the final outcome of the disease process should serve as a guide for subsequent cases.

DISCUSSION.

Dr. A. L. CHUTE, of Boston: My personal experience with vaccines has been limited practically to their use in suppurations in the genito-urinary tract.

These infections seem to fall naturally into three great groups, which, in order of frequency, are: the gonorrheal infections, the infections with the common pyogenic organisms, and the infection with the tubercle bacillus.

It seems unwise at present to attempt to estimate the value of tuberculin in the treatment of tuberculosis of the urinary tract. The disease is often a very slow one, and perhaps sufficient time has not yet elapsed to allow us to draw accurate conclusions as to its value.

The infections of the urethra, prostate and epididymis with the gonococcus may be considered together. A con-

siderable use of the gonococcus vaccines, both the autogenous and the stock, at the time when its use was first advocated, convinced me that it was powerless to influence the course of infections of this sort. In gonorrheal urethritis the intensity of the attack varies greatly, as it also does in epididymitis and prostatitis. One sees cases in which the acute symptoms disappear under the use of vaccine, but as this is the usual course of the disease, this argues nothing for the efficacy of vaccines. In comparing, in the same clinic, a number of cases treated with vaccines, and a number treated with the usual methods by irrigation, my conclusion was that the vaccine treatment was not as effective as the older method; that it had no specific action. I think this is the conclusion that most men have reached regarding this method of treatment.

When one comes to the infections of the urinary tract with the common pyogenic organisms, the colon bacillus, staphylococcus, proteus, micrococcus ureæ, pyocyaneus, etc., one must consider the ordinary course of these infections in order to estimate the value of vaccines. The acute infections of this type tend to improve and to get well either without treatment or under very simple treatment, in cases where the drainage is efficient, that is, when the bladder and kidney pelves empty themselves completely. When vaccines are used in such cases, their use in no way hinders the usual course of the disease and gives color to their apparent efficiency. The cases in which spontaneous recovery is not the rule are for the most part those in which there is poor drainage. I have treated a moderate number of such cases with autogenous vaccines, and have seen a much larger number. In none have I been able to see that the vaccine treatment produced any effect. The same thing applies to cases of bacteruria.

At the meeting of the American Association of Genito-Urinary Surgeons in May of this year, this subject was taken up. O'Neil, who made a report on the status of vaccine treatment from a study of the literature, drew the conclusion that the use of vaccines in this class of cases was without effect. Geraghty, also, reported a number of cases of urinary infections with the various pyogenic organisms, in which he had followed up the vaccine treatment for a year or more, and in which the result was negative.

I feel that it remains to be proven that the use of vaccines affects in the slightest degree the natural course of infection of the urinary tract with pyogenic organisms. In such cases as I have tried them they have been unsuccessful. This method of treatment has also been unsuccessful in many cases that I have seen in which others have tried vaccines. Its successes, I believe, have been limited to the instances where it has been used in cases that would have gotten well without its use.

Dr. Timothy Leary, of Jamaica Plain, discussed Dr. Smith's paper, but did not care to have his remarks printed.

Dr. Lesley H. Spooner, of Boston: Dr. M. W. Richardson cannot be present and he has asked me to say just a few words on anti-typhoid vaccination. This subject I studied through Dr. Richardson's instigation six months ago, the investigation covering a period of six months at the Massachusetts General Hospital. The research was undertaken because of the relatively high morbidity of typhoid contracted in that institution, two per cent. of those exposed having developed the disease. The results were satisfactory in two ways—in the first place by the small doses of vaccine I was able to eliminate any constitutional reaction and reduce the local reaction to a minimum. In the second place, by producing Widal reactions in dilutions which compare very favorably with those produced by the disease itself. Lastly, I may state that no typhoid has been contracted in the hospital within the last year. This is not absolutely conclusive, of course, but it is at least very encouraging.

From this work it seems to me that it may be concluded that typhoid vaccination should be utilized among those constantly exposed to the diseases, such as physicians and nurses. It should also be advised among those who are travelling abroad and, even more, through this country, where typhoid may be contracted easily, from water and milk supplies; and thirdly that it may be encouraged in communities where typhoid is epidemic, also in families where a case is recognized early in the disease and where other members of the family have been exposed.

Other work has been done recently in America, and Major Russell of the U. S. Army has published an admirable

report in the Johns Hopkins bulletin of December, 1909, covering a very extensive work.

The salient facts which have been brought out in my own work are that I have been able to produce in a series of one hundred cases Widal reactions of such a high degree that they indicate an immunity against the disease, by the use of small doses, frequently repeated. And that these small administrations of vaccine do not give rise to the violent constitutional reactions which have been so troublesome to the inoculated in England.

ARTICLE XXXVIII.

THE OCCURRENCE OF INFANTILE PARALYSIS IN MASSACHUSETTS IN 1909

REPORTED FOR THE

MASSACHUSETTS STATE BOARD OF HEALTH.

By ROBERT W. LOVETT, M.D.

OF BOSTON.

READ JUNE 8, 1910.

THE OCCURRENCE OF INFANTILE PARALYSIS IN MASSACHUSETTS IN 1909.

THE medical profession of to-day is confronted with the task of constructing a new literature on the subject of infantile paralysis. What was written five years ago is to-day largely out of date and the standard text books cannot naturally present the latest point of view, so rapid has been the recent progress of our knowledge in regard to this disease. The chief contributors to this rapid advance have been first and foremost Flexner and Lewis in demonstrating the etiology, Wickman of Sweden in giving us a new symptomatology and defining types not before recognized, and Harbitz and Scheele of Norway in formulating the pathology.

The present paper will consist first of a condensed report of the recent progress of our knowledge with regard to the disease, and secondly of the data obtained with regard to the disease in this State in 1909 by the State Board of Health.

I.—REPORT OF PROGRESS.

The most important step in our knowledge of the disease consists in the establishment during the past year of its infectious character by several observers. With the ability to produce the disease in monkeys by inoculation there has been given the opportunity to study its etiology, symptoms and pathology, which opportunity did not exist before.

EXPERIMENTAL PRODUCTION.

Infantile paralysis has been recently shown to be an infectious disease caused by a living organism so small that it can pass through the finest bacterial filter. It is invisible to the

microscope and the ultramicroscope. [17] This places the disease in the class of those caused by a filterable virus, similar diseases of this class being yellow fever, foot and mouth disease, pleuro pneumonia of cattle, etc. It can be caused in monkeys by inoculation with an emulsion of certain tissues from a human being dying of the disease, and from affected monkeys. [41], [17], [10], [30], [50]

The virus is contained in the brain and the spinal cord, the mucous membrane of the naso-pharynx, infected lymphatic glands, in the salivary glands,[10] and in the acute stage in the blood and cerebro-spinal fluid.[17]

The disease may be caused by inoculation by the following routes: intracerebral, subdural, intra and perineural, intraperitoneal, subcutaneous, by the circulation and by implantation in the anterior chamber of the eye. [10], [17], [41]

By the digestive route it has been caused by introducing an emulsion into the stomach by means of a catheter and by introduction of the virus into intestines paralyzed by opium. [41]

By the respiratory route the disease has been caused by rubbing the nasal mucous membrane after scarification with a virulent suspension [17], by the same procedure without scarification, by inhalation of a virulent emulsion and by implantation of infected issue in the trachea. [41]

The fact that the disease may be caused by virus entering both respiratory and digestive tracts must be remembered when we come to inquire how the virus enters the human body.

Inoculations into horses, calves, goats, pigs, sheep, rats, cats, mice, [30] rabbits, [39] chickens,[42] guinea pigs, [30] and dogs, have proved negative except for the results of Krause and Meinicke [24] who caused paralysis in rabbits by inoculation with virulent material, but their results are not generally accepted by other observers as they are in contradiction to practically all other experimental work and not sufficiently supported by pathological evidence.

The virulence of an emulsion is not impaired by drying for seven days, by freezing nor by suspension in glycerine, [10], [17], [30], but is injured by a temperature of 45°-50° C. [17] The virus is not always affected by dilution, a solution of the one to a thousand working as quickly and effectually as full strength.[41]

The stage of incubation in monkeys is from six to upwards of thirty days, and the long incubation period in monkeys suggests the possibility that in the human being some of the late fall and early winter cases may have acquired their infection when the disease was prevalent in August and September. The ordinary incubation period in human beings is not known, it is generally stated as from one to fourteen days.

IMMUNITY.

One attack of the disease apparently confers immunity to future attacks [17], [10], [31], [41]. This is the accepted clinical history in human beings, and has been found to be the case in monkeys inoculated experimentally.

Active immunization in monkeys has been secured by the repeated injection of small doses of virus repeated many times, after which a full dose has had no effect.[17]

Passive serum protection has been obtained by mixing with an active dose of the virus an equal amount of the blood serum of a recovered monkey which neutralizes the effect of the virus, and in the same way the blood serum of children who have recovered, when mixed with the virus in proper proportions neutralizes its effect.[17] Attempts to secure a neutralizing serum from horses who have received repeated injections of virus have not been successful. Even if we had at hand a therapeutic serum for this disease it must be evident that such a serum to be of use must be used early in the disease, and at present our diagnostic knowledge is not sufficient to enable us to use it before the destruction occurs in the cord. The diagnosis is now rarely made before the paralysis occurs, and a better knowledge

of the early symptoms and diagnostic signs of the disease is one of our most urgent needs and indicates the line in which our investigation for the present year should progress.

DIAGNOSIS.

In the matter of clinical diagnosis the last year has added a little to our knowledge, chiefly in the way of a better knowledge of early symptoms. The eight types of the disease as described by Wickman are not, however, sufficiently known in the English language, and a translation of his book would be of great value (Wickman, Beitrage zur Kenntniss der Heine Medinschen Krankheit Berlin, 1907), although a short abstract has been made of it.[18]

Müller[33] investigating at the request of the authorities an epidemic in Westphalia in 1909 considered three symptoms of great importance in the early stages. These were (1) tendency to profuse sweating; (2) hyperæsthesia and sensitiveness to movements, and (3) leucopenia. Respiratory and digestive symptoms were common in the earlier stages, and the incubation period was at least five days.

Krause[23] was commissioned by the Government in 1909 to investigate an epidemic, consisting of 436 cases, occurring in Germany in the neighborhood of Hagen. He found digestive symptoms present in 90% of all cases at the onset and occasionally respiratory symptoms. He calls especial attention to the importance of sweating and tenderness as early symptoms.

The later laboratory findings suggest that certain characteristics of the blood and cerebro-spinal fluid in the stage preceding paralysis may enable us to make an earlier and surer diagnosis, but these findings have not yet appeared in print.

INCREASING FREQUENCY OF OCCURRENCE.

It is generally believed that infantile paralysis is becoming more common and more widespread of late years, but

one must bear in mind that there is a possibility that this is because the disease is better known and more frequently recognized. As this is a matter of importance it seems proper to examine the evidence on this point.

The recognition of outbreaks of infantile paralysis is of comparatively recent date. Bergenholz, a Swede, writing in 1881, is generally credited with having been the first to recognize and describe such an outbreak with sufficient accuracy to make it acceptable. Since that time outbreaks have been reported with increasing frequency. From the time of the first generally accepted outbreak until the close of 1909 is roughly thirty years. This interval was subdivided into periods of five years, beginning with 1880–1884 inclusive and ending with 1905–1909 inclusive, and in each period was set down the number of outbreaks reported during these years:

	Cases.	Outbreaks.	Av. No. of Cases.
1880–1884	23	2	11.5
1885–1889	93	7	13.
1890–1894	151	4	38.
1895–1899	345	23	15.
1900–1904	349	9	39.
1905–1909	8054	25	322.

DISTRIBUTION OF OUTBREAKS.

The recent outbreaks have been widely distributed. From Norway and Sweden have been reported large and carefully studied epidemics, especially in the last ten years. Zappert [46] in 1908 and 1909 collected 266 cases in Vienna and Lower Austria, and Ghon noted many cases in Upper Austria (Styria and Carinthia). In Germany in 1909 the disease was very prevalent. The Westphalia epidemic of 436 cases[23] has been spoken of above. In Rhenish Prussia there were said to have been about 100 cases, and around Marburg about 50. There were cases in the province of Hanover and about 50 cases in Silesia. Numerous small

epidemics were reported. It is estimated that there must have been over 1000 cases in Germany in 1909.[47] In Holland 24 cases were reported from Leyden and others between August and October in other parts of the country.[47]

England seems to have been comparatively immune and only a small epidemic of 8 cases was reported from Spain. Although no large epidemic occurred in France there was a consensus of opinion among the medical men quoted by Netter that an unusually large number of cases of infantile paralysis had been seen in 1909.[47], [49]

The United States suffered severely. Minnesota[48] had several hundred cases, Nebraska[36] 619, Kansas about 80, and Massachusetts nearly 1000.

The report[51] of the New York epidemic of 1907 has just become available for study. The fact that this epidemic of 2500 cases was the largest ever reported, the painstaking character of the work done and the scientific standing of the committee in charge of the investigation, make the report of the greatest importance and value. It is impossible in this place to abstract so condensed and exhaustive a work.

A most interesting and important epidemic of 140 cases has been reported as occurring in 1909 in the Province of Santa Clara in Cuba.[53] Previous epidemics have been reported from the temperate zones of the north and south hemispheres, chiefly in the northern parts of the former. The Cuban epidemic, as the first reported from the tropics, possesses peculiar interest as to season, distribution, etc. Apparently the disease did not exist in Cuba prior to 1907. In 1907 and 1908 one or two suspicious or authenticated cases appeared in the neighborhood of Havana, the disease becoming epidemic in the Province of Santa Clara in 1909. A survey of the field makes it seem very probable that the disease was imported from New York

as a result of the 1907 epidemic there, and that certain unknown determining conditions made the Province of Santa Clara susceptible to a severe outbreak. As in the temperate zones the disease occurred during the summer, reaching its maximum in July and August. The chief incidence was between the ages of 1 and 3, males were predominantly affected, and the black race was evidently much less affected than the white, in 72 cases the proportion being: whites, 60; mixed race, 4; negroes, 8. The mortality rate was 7.89%.

The time has gone by when the routine reports of epidemics is of any especial value, nor is the exact tabulation of numbers of epidemics of any particular use except as throwing light on the general distribution of the disease and possibly in this way defining some of its characteristics.

The disease is manifestly prevalent and it is widespread and increasing. Useful work in the future will consist in the exact and careful house to house study of epidemics both large and small.

Of the 8054 cases reported in the last five years (a number, of course, only approximately correct) the United States contributed 5514 cases or about 5/7 of the total number of cases. The bulk of these cases has moreover been reported from the Northern States, the outbreaks in the Southern States being insignificant. In the same way in Europe, Norway and Sweden contributed about 1500 cases and Germany practically the rest, except for an outbreak in Australia, which occurred in March, which is their early fall.

As the literature has been very carefully gone over, and as, in the present state of interest in the subject, it seems fair to assume that large outbreaks in any civilized country have been reported, it would seem that the following conclusions were justified.

1. That outbreaks of infantile paralysis have very greatly increased in several parts of the world in the last

five years in a measure not to be explained in any way by the increased interest in the disease.

2. That it is more prevalent in cold than in warm countries.
3. That from the northern part of the United States have been reported more cases than from any part of the world.

The study of these seventy outbreaks, reaching over a period of 30 years, has led, of course, to the knowledge of certain facts with regard to the disease, but they have not given us the essential facts as to how the disease enters the body nor how to prevent or check its spread.

RELATION TO INFLUENZA.

A recent book [52] deals with the theory that the disease is merely a form of influenza, a contention already discussed prior to 1905 and antagonized by Wickman. The book in question deals with a study of 303 cases occurring in Sweden, each case being considered by itself. The point of view of the author is shown in the following quotation: "I must therefore regard this (the intermittent type of influenza) as a very certain proof for my view acquired on other grounds, that acute infantile paralysis is a nervous form of influenza." Recent progress in the epidemiology of infantile paralysis makes this view seem improbable.

TRANSMISSIBILITY.

In the writings of the last year there is no dissent from the opinion that the disease is communicable. Direct transmission is apparently frequent, transmission by means of a healthy carrier is more than probable, and infection occasionally appears to remain in a house where the disease had previously occurred.

On the other hand the disease is evidently not very "contagious" in the ordinary acceptance of the term. In the epidemic in the Deerfield valley, in Massachusetts in 1908, so

carefully studied by Emerson,[2] there were 67 cases. There were 166 other children in the families of those affected and 86 other children known to be in intimate contact with the 67. Of the 252 four later developed the disease.

Hill[48] of the State Board of Health of Minnesota has contributed a careful study of the transmissibility of the disease written in a spirit of scientific skepticism. Of 161 cases reported as anterior poliomyelitis he accepted only 85 as surely valid and analyzed 81 of these occuring in 69 families. Sixty-nine of these cases were primary and 12 occurred secondarily in the same families. The secondary cases thus were 17 % of the primary. Contrasting this with the records of other infectious diseases in the same State the percentage of secondary cases to primary was as follows:

Scarlet fever	40 %
Typhoid fever about	30 %
Diphtheria	29 %
Anterior poliomyelitis	17 %

Of persons known to have been exposed to diphtheria, scarlet fever and anterior poliomyelitis the percentage contracting the disease was as follows:

Scarlet fever	22 %
Diphtheria	17 %
Anterior poliomyelitis	6 %

The disease is thus apparently less readily transmissible than the diseases mentioned in persons exposed, but such figures cannot be considered representative until the abortive cases are included.

The study of the epidemiology of a disease falls into two parts, the study in the laboratory and the study in the field. The most notable contribution as yet to our knowledge of this disease is from the laboratory where Flexner and Lewis have established its infectious nature. This fact has nar-

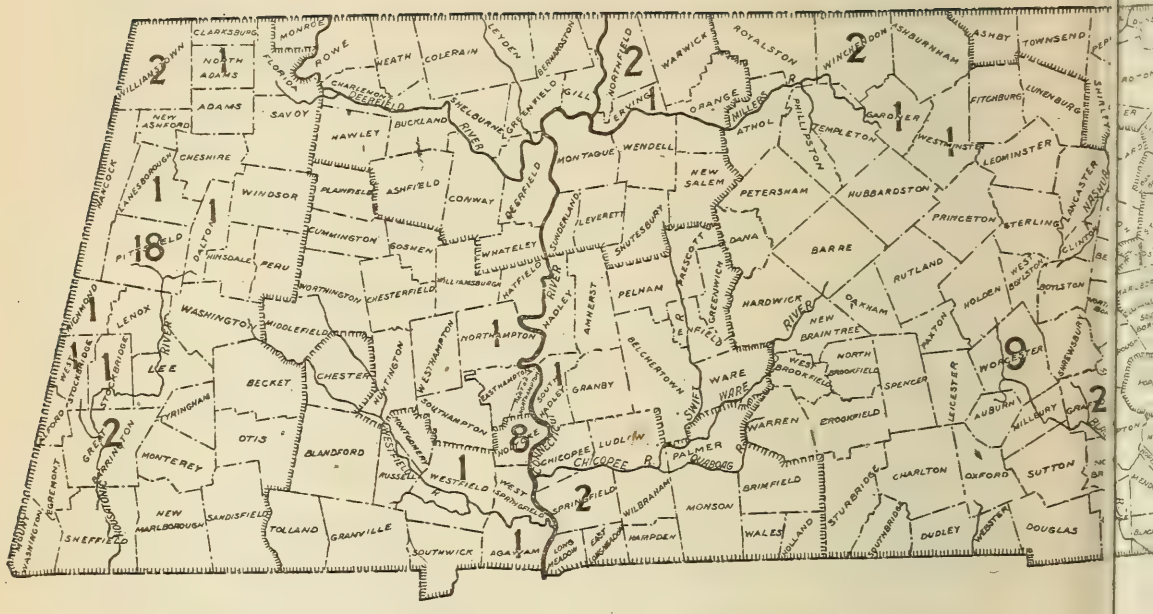
rowed the field of our inquiry and enables us to pursue a more definite and promising scheme, but one should remember that work in the field, comparatively fruitless as it has so far been, holds its place. We knew for many years the organism of malaria and the pathological changes occurring in the disease, but we could not control malaria until we found that it entered the body through the agency of the mosquito. So it is quite possible for us to know much of the bacteriology and pathology of a disease from the laboratory without being able to control or suppress it and such knowledge must be supplemented by field work; that is, a study of external conditions to round out our investigation and to make it as effective as we should wish.

II.—INFANTILE PARALYSIS IN MASSACHUSETTS IN 1909.

In the year 1909 Massachusetts suffered as much from the disease as any country in Europe, and as many cases were reported here as in the two other most severely affected States in the Union—Nebraska and Minnesota—taken together.

In Massachusetts in 1907 we had begun the investigation of the disease by sending out inquiry blanks to be filled in by the general practitioner. That resulted in a loose collection of 234 cases, the results of which were published. [1] In 1908, half of our 136 cases occurring in the State were located in Franklin County, and these 67 cases were thoroughly studied by Emerson, who lived in the district a month for the purpose. These studies were published. [2]

In 1909 it was decided to take up the matter more seriously. A special agent, Mr. Sheppard, a fourth year student at the Harvard Medical School, was detailed as a special investigator, and in February, 1910, another special investigator was added to the staff in the person of Dr. Hennelly, a recent graduate of the Harvard Medical School and of the Boston City Hospital. It was thought desirable to have expert advice in conducting the inquiry, and three gentlemen were requested to act as an advisory committee


CLARKSBURG
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ADAMS
NEW ASHFORD
SAVOY
CHESHIRE
WINDSOR
PLAINFIELD
ASHFIELD
CONWAY
BUCKLAND
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CHARLEMONT
DEERFIELD
SHELBURNE
GREENFIELD
GILL
MONTAGUE
WENDELL
NEW SALEM
ORANGE
ATHOL
PETERSHAM
HUBBARDSTON
PHILLIPSTON
TEMPLETON
GARDNER
WESTMINSTER
LEOMINSTER
FITCHBURG
LUNENBURG
ASHBY
TOWNSEND
SHIRLEY
PRINCETON
STERLING
LANCASTER
BOLTON
HARVARD
BARRE
RUTLAND
OAKHAM
HOLDEN
PAXTON
WORCESTER
SPENCER
WEST BROOKFIELD
NORTH BROOKFIELD
BROOKFIELD
WARREN
AUBURN
MILLBURY
GRAFTON
CHARLTON
OXFORD
SUTTON
DUDLEY
DOUGLAS
STURBRIDGE
SOUTHBRIDGE
WALES
HOLLAND
BRIMFIELD
MONSON
PALMER
THREE RIVERS
CHICOPEE
LUDLOW
SPRINGFIELD
WILBRAHAM
EAST LONGMEADOW
LONGMEADOW
HAMPDEN
AGAWAM
WEST SPRINGFIELD
WESTFIELD
RUSSELL
HOLYOKE
SOUTHWICK
GRANVILLE
TOLLAND
SANDISFIELD
NEW MARLBOROUGH
SHEFFIELD
MONTEREY
BLANDFORD
OTIS
TYRINGHAM
LEE
LENOX
WASHINGTON
BECKET
CHESTER
MIDDLEFIELD
PERU
WORTHINGTON
CHESTERFIELD
CUMMINGTON
GOSHEN
WILLIAMSBURG
HATFIELD
WHATELY
SOUTH HADLEY
HADLEY
AMHERST
PELHAM
GRANBY
SOUTH HAMPTON
EASTHAMPTON
NORTHAMPTON
WEST HAMPTON
BELCHERTOWN
GREENWICH
PRESCOTT
DANA
GRANBY
SUNDERLAND
LEVERETT
SHUTESBURY
NORTHFIELD
ERVING
WARWICK
ROYALSTON
WINCHENDON
SHIRLEY
RIVER
CONNECTICUT
MILLERS
DEERFIELD
CONNECTICUT
WESTFIELD
WARE
NEW BRAINTREE
HARDWICK
GREENWICH
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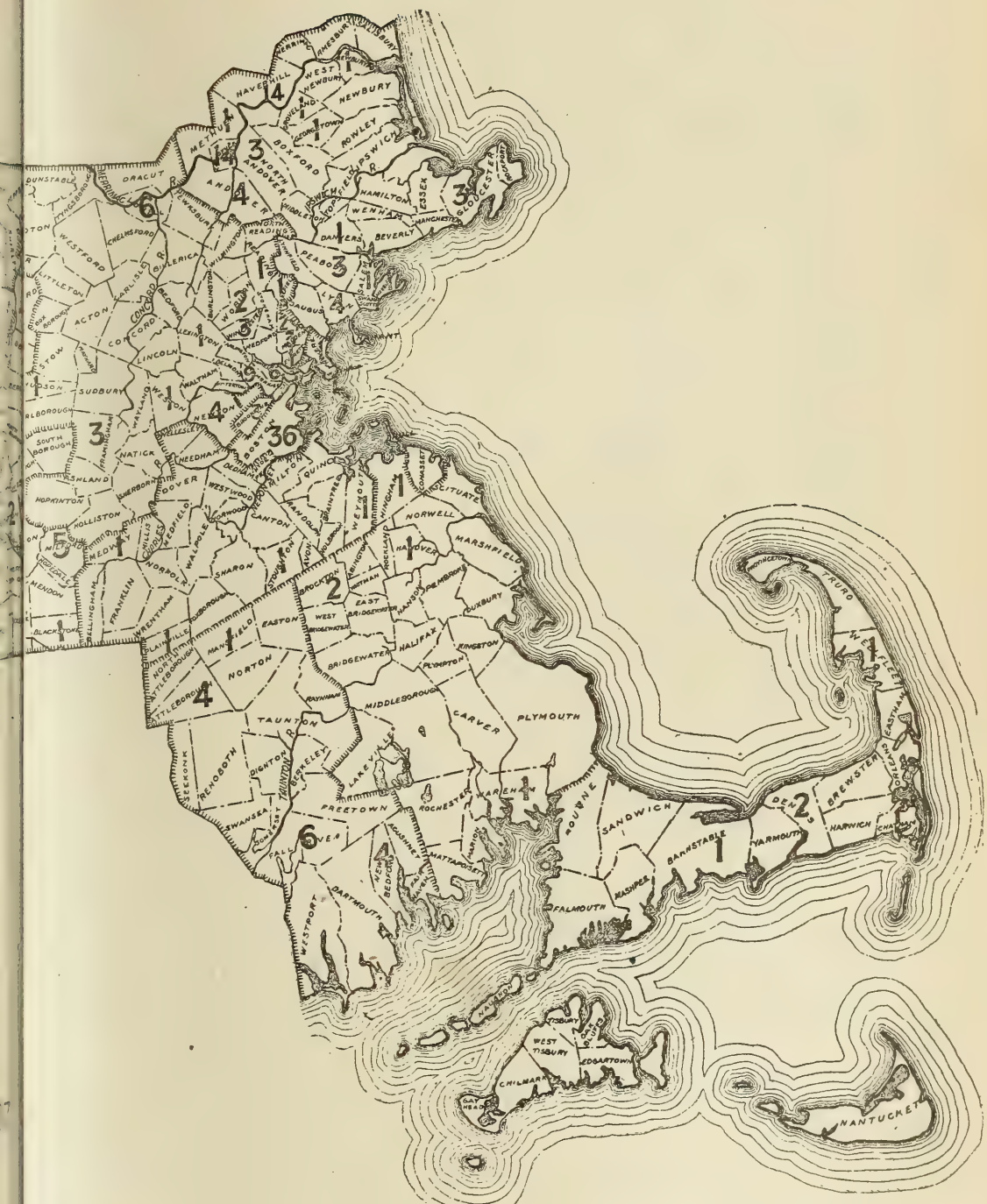
NANTUCKET
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ORLEANS
BREWSTER
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BARNSTABLE
SANDWICH
MASHPEE
FALMOUTH
BOURNE
PLYMOUTH
CARVER
MARSHFIELD
DUXBURY
KINGSTON
PLYMPTON
HALIFAX
MIDDLEBOROUGH
BRIDGEWATER
NORTON
TAUNTON
RAYNHAM
EASTON
STOUGHTON
RANDOLPH
HOLBROOK
WEYMOUTH
BRAINTREE
QUINCY
MILTON
NORWELL
HANOVER
HANSON
ROCKLAND
ABINGTON
WHITMAN
HINGHAM
HULL
COHASSET
SCITUATE
ROCHESTER
MATTAPOISETT
FAIRHAVEN
FREETOWN
LAKEVILLE
ACUSHNET
NEW BEDFORD
DARTMOUTH
WESTPORT
SWANSEA
SEEKONK
REHOBOTH
DIGHTON
BERKLEY
TISBURY
WEST TISBURY
EDGARTOWN
CHILMARK
GAY HEAD
WALPOLE
NORWOOD
SHARON
FOXBOROUGH
FRANKLIN
WRENTHAM
NEEDHAM
DEDHAM
NATICK
WELLESLEY
NEWTON
BROOKLINE
BOSTON
CHELSEA
REVERE
WINTHROP
MILTON
WALTHAM
WATERTOWN
BELMONT
ARLINGTON
LEXINGTON
CONCORD
LINCOLN
SUDBURY
WESTON
WAYLAND
FRAMINGHAM
HOPKINTON
HOLLISTON
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MOODUS
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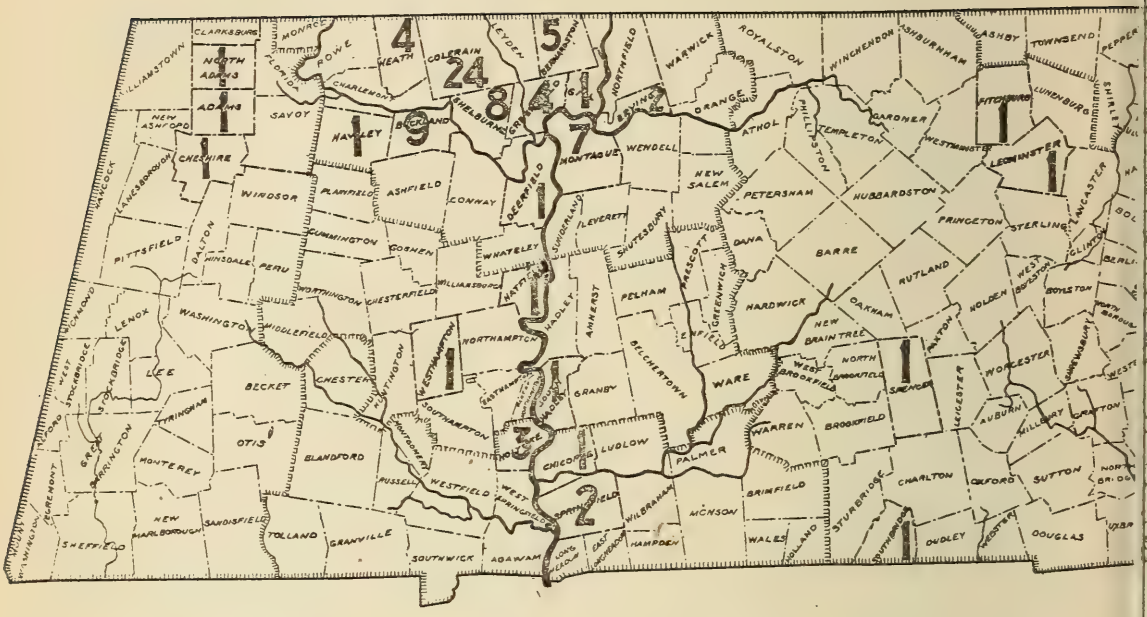
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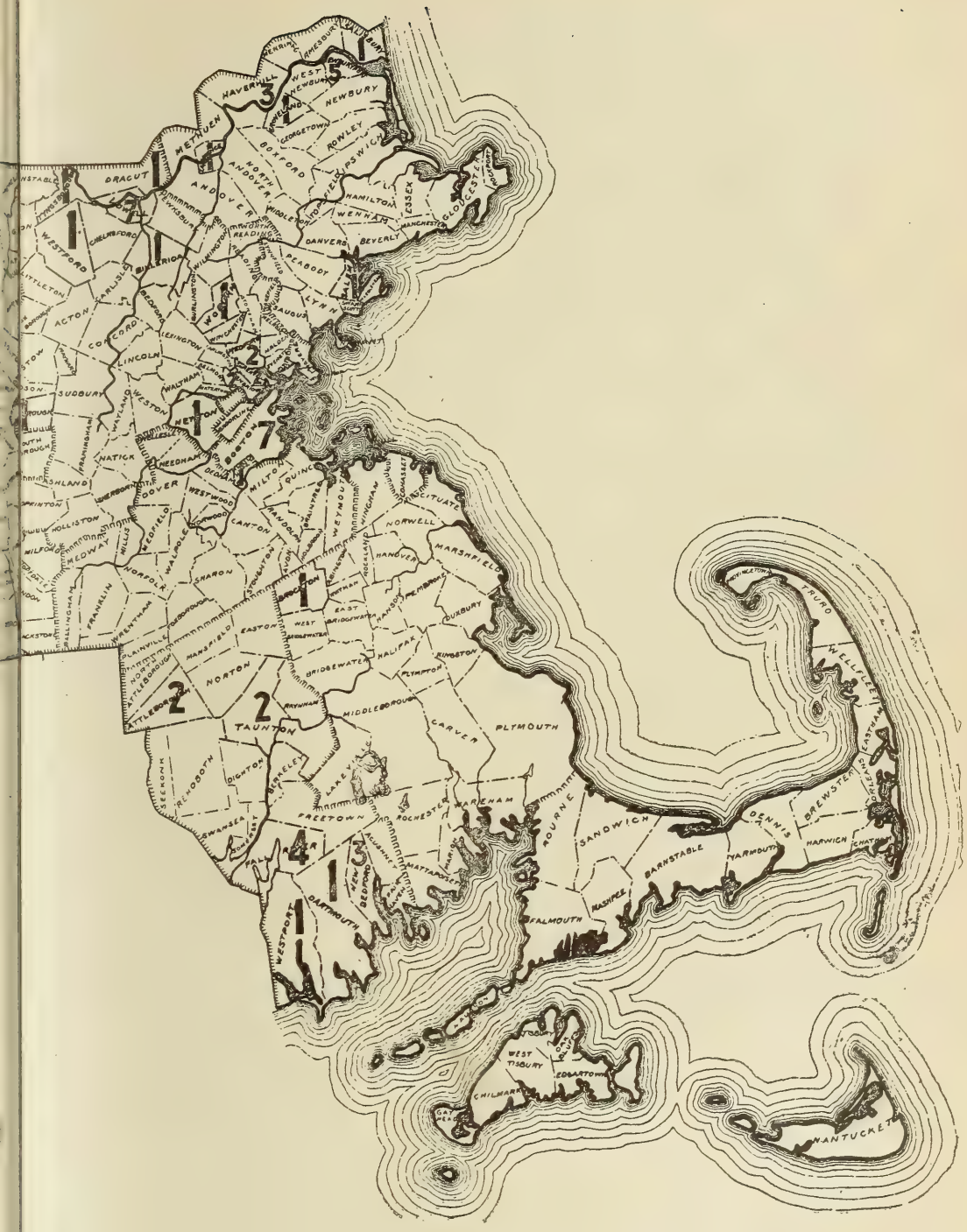
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BEVERLY
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PEABODY
LYNN
SAUGUS
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LEXINGTON
CONCORD
ACTON
LINCOLN
SUDBURY
WESTFORD
CHELMSFORD
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NATICK
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DOVER
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QUINCY
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CANTON
NORWELL
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BRIDGEWATER
HALIFAX
PLYMPTON
KINGSTON
NORTON
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CARVER
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ROCHESTER
MARION
MATTAPOISETT
FAIRHAVEN
ACUSHNET
FREETOWN
SWANSEA
REHOBOTH
DIGHTON
BERKLEY
DARTMOUTH
WESTPORT
FALMOUTH
MASHPEE
BARNSTABLE
SANDWICH
BOURNE
YARMOUTH
DENNIS
HARWICH
BREWSTER
CHATHAM
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WELLFLEET
TRURO
PROVINCETOWN
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CHILMARK
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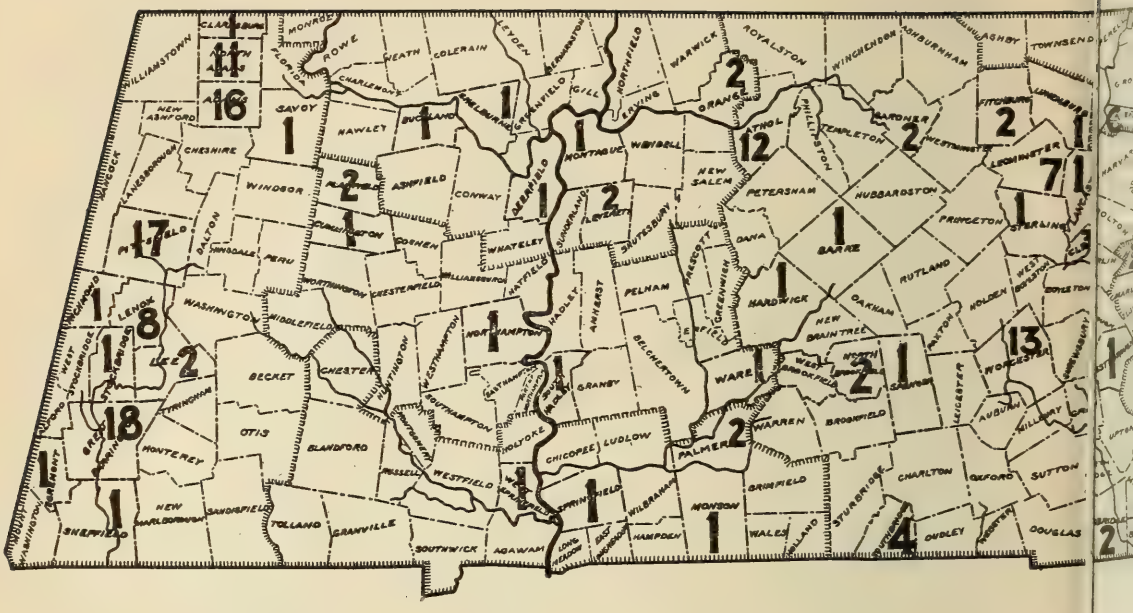

· 1909 ·

STATE BOARD OF HEALTH

MAP OF THE

STATE OF MASSACHUSETTS.

SHOWING

THE DISTRIBUTION OF INFANTILE PARALYSIS IN 190

SCALE OF MILES

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50

DRACUT
TYNGSBOROUGH
GROTON
WESTFORD
CHELMSFORD
TEWKSBURY
ANDOVER
NORTH ANDOVER
METHUEN
BOXFORD
GEORGETOWN
ROWLEY
NEWBURY
HAVERHILL
MERRIMAC
AMESBURY
SALISBURY
NEWBURYPORT
WEST NEWBURY
GROVELAND
HAMILTON
WENHAM
ESSEX
GLOUCESTER
MANCHESTER
BEVERLY
DANVERS
PEABODY
MIDDLETON
WILMINGTON
READING
NORTH READING
WOBURN
STONEHAM
MELROSE
WAKEFIELD
LYNNFIELD
LYNN
SAUGUS
REVERE
WINTHROP
CHELSEA
EVERETT
MALDEN
MEDFORD
ARLINGTON
BELMONT
CAMBRIDGE
SOMERVILLE
BOSTON
BROOKLINE
NEWTON
WATERTOWN
WALTHAM
LEXINGTON
BEDFORD
CONCORD
ACTON
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MAYNARD
SUDBURY
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HOPKINTON
HOLLISTON
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MEDWAY
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WRENTHAM
FRANKLIN
BELLINGHAM
WALPOLE
NORWOOD
CANTON
STOUGHTON
DEDHAM
DOVER
WESTWOOD
MILTON
QUINCY
HINGHAM
HULL
HANOVER
NORWELL
MARSHFIELD
SCITUATE
PEMBROKE
DUXBURY
KINGSTON
PLYMOUTH
HALIFAX
PLYMPTON
MIDDLEBOROUGH
CARVER
BRIDGEWATER
WEST BRIDGEWATER
EAST BRIDGEWATER
WHITMAN
ABINGTON
ROCKLAND
HANSON
HINGHAM
NORTON
TAUNTON
RAYNHAM
EASTON
BROCKTON
AVON
RANDOLPH
HOLBROOK
WEYMOUTH
BRAINTREE
NORTH ATTLEBOROUGH
PLAINVILLE
ATTLEBOROUGH
SEEKONK
REHOBOTH
DIGHTON
BERKLEY
LAKEVILLE
FREETOWN
ROCHESTER
MARION
MATTAPOISETT
WAREHAM
BOURNE
SANDWICH
FALMOUTH
MASHPEE
BARNSTABLE
YARMOUTH
DENNIS
BREWSTER
ORLEANS
EASTHAM
WELLFLEET
TRURO
PROVINCETOWN
WESTPORT
DARTMOUTH
NEW BEDFORD
FAIRHAVEN
ACUSHNET
SWANSEA
TISBURY
WEST TISBURY
EDGARTOWN
CHILMARK
GAY HEAD
NANTUCKET

to the Board. These were Dr. Theobald Smith, Professor of Comparative Pathology, Dr. M. J. Rosenau, Professor of Preventive Medicine and Hygiene, and Dr. J. H. Wright, Pathologist to the Massachusetts General Hospital and Assistant Professor of Pathology, all of the Harvard Medical School. The Secretary of the Board, Dr. Mark W. Richardson, has given freely of his time and effort in conducting the details of the inquiry. This Advisory Committee has met the members of the Board who are concerned in the inquiry at frequent conferences, studied the reports submitted and advised as to the most promising lines of investigation.

The two investigators have conducted a house to house investigation and have filled out their own blanks; they have been instructed to work in all cases through the family physician; they have obtained from the family a careful history of the attack and they have examined the affected children. It has not been possible under these conditions to make rapid progress, and at this time only 150 cases have been thus carefully studied. It seemed to us better to confine the investigation to certain localities, making it exhaustive in certain affected districts in the neighborhood of Boston, rather than to take up a scattered investigation throughout the State. Up to this time the expense of the inquiry had been borne by the Board out of its regular appropriation, but in January, 1910, the Board asked the Legislature for a special appropriation of $5,000 to enable the Board to make a proper and adequate inquiry into this disease as it occured in the State in 1910. This sum of money was voted without question or opposition. It is our purpose to have on hand a sufficient number of investigators during the coming summer to be able to look into the surroundings of every case within 48 hours of the time when the case is reported.

In presenting for the Board some of the results obtained in 1909 it is only proper to say that in the present state of

our knowledge no one can say which data are relevant and important and which are not. It is possible that certain facts which now seem of no importance may be of assistance to some future investigator. So far as practicable our data are presented in graphic form.

There are three classes of cases dealt with in this report: (*a*) the total number reported (923), (*b*) the number in which blanks were filled out (628), (*c*) the number thoroughly studied (150). All three classes are utilized in different tables, some being available for one purpose and some for another.

DISTRIBUTION IN THE STATE.

A consideration of the distribution of the disease in the state of Massachusetts for the past three years shows that in all three years the disease occurred in scattered foci in all parts of the state, but was more frequent in the river valleys than away from rivers; that a case rarely occurred in a town without one or more cases in contiguous towns, and that localities severely affected one year were lightly affected the next, *e. g.* the outbreak in the upper Connecticut valley in 1908 was followed by very few cases in 1909 in that region. In the next year but one however localities markedly affected may again show many cases, *e. g.* in 1907 the extreme western end of the state showed many cases, in 1908 almost none and in 1909 again many cases. The metropolitian district shows of course a large number of cases and it will be noted that in general there were more cases of the disease in the towns north of Boston than in towns south of it.

DISTRIBUTION IN BOSTON.

Analyzing the relative prevalence of the disease in the different parts of Boston, the distribution of the cases shows nothing. The incidence was greatest in Dorchester, which is on the shore and not altogether thickly settled; next in

Charlestown, on the shore and densely populated; next in the city proper, densely settled, and so on, districts on the shore and inland alternating, and density of population having apparently no influence.

	Population 1905.	No of Cases.	Incidence per Thousand.
Dorchester . . .	93,771	76	0.81
Charlestown . . .	39,983	24	0.60
Boston, City Proper	159,512	86	0.54
Roxbury, West Roxbury and Jamaica Plain	161,097	67	0.42
Brighton	21,806	9	0.41
East Boston . . .	51,334	20	0.39
South Boston . .	67,877	17	0.25
Total	595,380	299	0.50

RELATIVE DISTRIBUTION IN CITIES AND TOWNS.

There are 354 cities and towns in Massachusetts, in 136 of which there occurred cases of infantile paralysis in 1909. These 136 cities and towns were listed according to the prevalence of the disease in each per 1,000 of the inhabitants. The incidence ran from 526 per 100,000 inhabitants to 15 in 100,000. Taking the first 25 where the incidence per 1,000 was highest, the average population was 3,295 and only 4 towns were over 7,000. Taking the last 25 on the list where the incidence per 1,000 was least, the average population was 34,860, and no city or town was under 7,000 in population. Therefore in 1909 the disease was relatively much more prevalent in small towns than in the cities and larger towns.

List of 25 Cities and Towns where the Disease was most Prevalent.

Town.	Population.	Cases.	Incidence per M.
Plainfield	382	2	5.26
Millis	1,089	4	3.66
Leverett . . .	703	2	2.83

Great Barrington	6,388	18	2.81
Lenox	3,058	8	2.61
Ayer	2,386	6	2.51
Walpole	4,000	8	2.00
Hull	2,060	4	1.94
Natick	9,705	18	1.85
Easton	1,089	2	1.83
Savoy	549	1	1.81
Winthrop	7,814	13	1.70
Richmond	601	1	1.66
Athol	7,305	12	1.64
Merrimac	1,884	3	1.59
Scituate	2,597	4	1.54
Sharon	2,085	3	1.44
Egremont	721	1	1.38
Cummington	740	1	1.35
Groveland	2,401	3	1.25
Salisbury	1,622	2	1.23
Foxborough	3,364	4	1.18
Adams	13,685	16	1.17

List of 25 Cities and Towns where the Disease was least Prevalent.

Towns.	Population.	Cases.	Incidence per M.
Belmont	4,360	5	1.15
Gardner	13,066	2	0.15
New Bedford	85,516	13	0.15
Maynard	7,147	1	0.14
Spencer	7,121	1	0.14
Lynn	84,623	11	0.13
Marblehead	7,209	1	0.13
Saugus	7,189	1	0.13
Montague	7,707	1	0.13
Braintree	7,595	1	0.13
Brockton	55,039	7	0.12
Marshfield	1,763	2	1.12
Lawrence	70,050	8	0.11
Ware	8,858	1	0.11
West Springfield	8,897	1	0.11

Methuen	9,608	1	0.10
Fall River	106,486	10	0.09
Chelsea	40,080	4	0.09
Framingham	11,749	1	0.08
Milford	12,722	1	0.08
Taunton	30,967	2	0.064
Beverly	13,386	1	0.061
Fitchburg	34,263	2	0.058
Salem	39,019	2	0.051
Lowell	94,889	5	0.05
Northampton	21,075	1	0.04
Springfield	84,237	1	0.012

GENERAL CONDITIONS.

Aside from the immediate environment of the patients there are certain general considerations of possible interest.

Rainfall by Years.

The last six years have been very dry. In 1907 there was practically a normal rainfall and 234 cases in the State. In 1908, a very dry year with 7 inches deficiency of rainfall, there were few cases—136. In 1909, with more rain (3 inches deficiency) there were 923 cases. In Massachusetts the prevalence of the disease by the year has not, therefore, been coincident with deficiency of rainfall.

Deficiency Rainfall 1904–1909, Inclusive.

Year.	Cases in State	Actual.	Normal	Deficiency.
1904	—	43.81	45.16	–1.35
1905	—	37.60		–7.56
1906	—	43.21		–1.95
1907	234	44.49		–0.67
1908	136	37.61		–7.55
1909	923	42.10		–3.06
				–22.14

Rainfall by Months in 1909.

The chart of the rainfall in 1909 in the State arranged by months does not correspond with the prevalence of the dis-

case in the State arranged also by months, the driest month preceding the month of greatest frequency of the disease, in the same way that the driest year preceded the year when the disease was most prevalent. (See Fig.)

Temperature by Months in 1909.

The curve of the average monthly temperature in Massachusetts in 1909 does not correspond with the curve of the frequency of the disease, the highest average temperature falling away before the highest incidence of the disease occurs. (See Fig.)

NUMBER OF FAMILIES AFFECTED AND POSSIBLE ABORTIVE CASES.

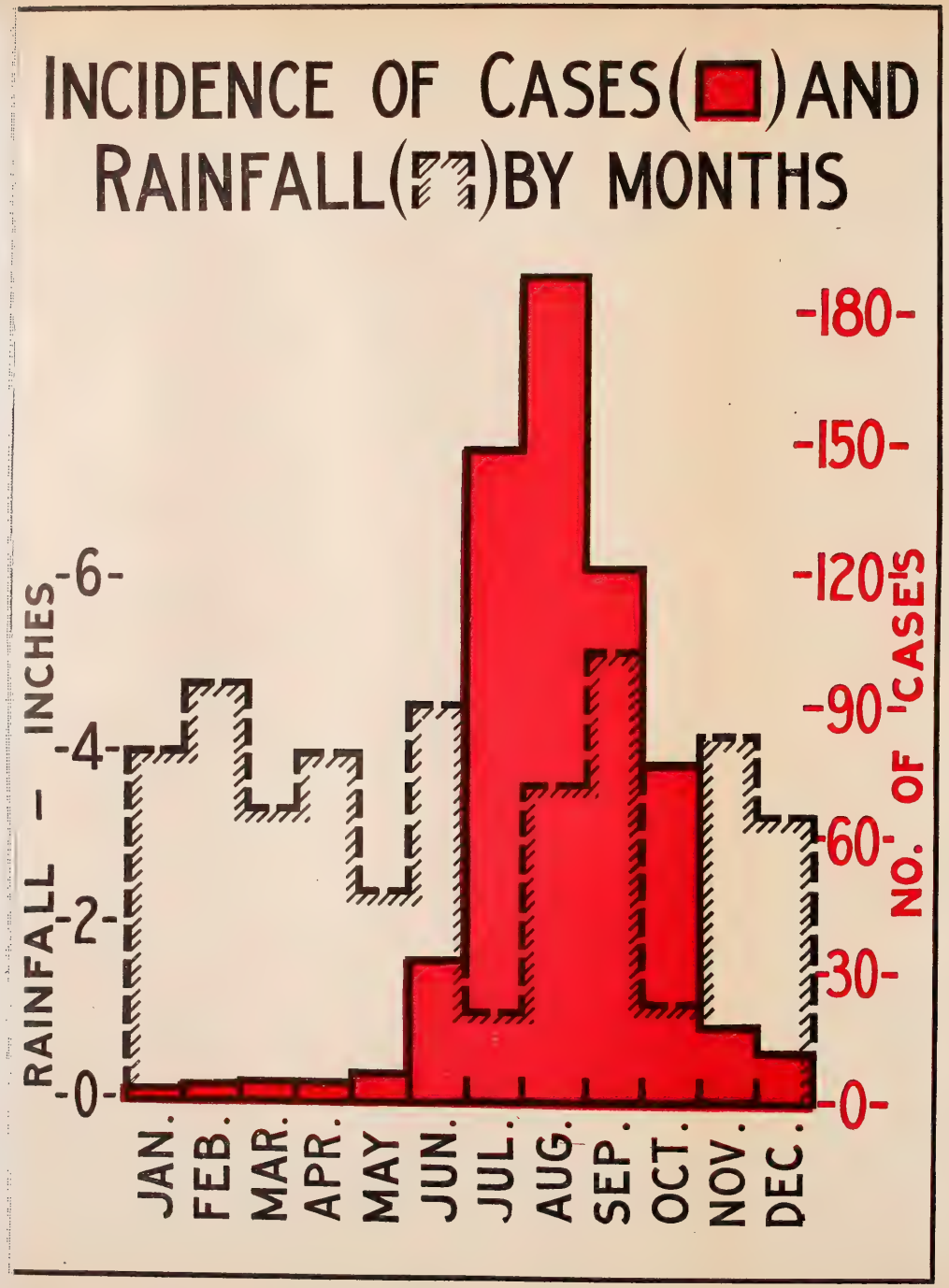
To make the following analyses clearer the following table is important as showing that the 150 cases carefully studied occurred in 142 families and also showing the probable existence of a fairly large number of abortive cases associated with them.

The one hundred and fifty cases of paralysis carefully studied, occurred in 142 families. The total number of children under fifteen in these 142 families was 479. The total number of children sick from any cause in these families, contemporaneously with the occurrence of paralysis, was 187, and 12 adults. Of the 187 sick children, 149 were paralyzed; of the 12 adults, 1 was paralyzed. This leaves 49 cases of contemporaneous illness not followed by paralysis which are to be reckoned as possible abortive cases of the disease.

Analysis of Cases Thoroughly Studied.

150 cases of Paralysis in 142 Families.

Total number of children		479
Number of children sick	187	
Number of adults sick	12	
		199
Number of children paralyzed	149	
Number of Adults paralyzed	1	
		150
Possible abortive cases		49


INCIDENCE OF CASES( ) AND
RAINFALL( ) BY MONTHS
RAINFALL - INCHES
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2
4
6
NO. OF CASE'S
0
30
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90
120
150
180
JAN.
FEB.
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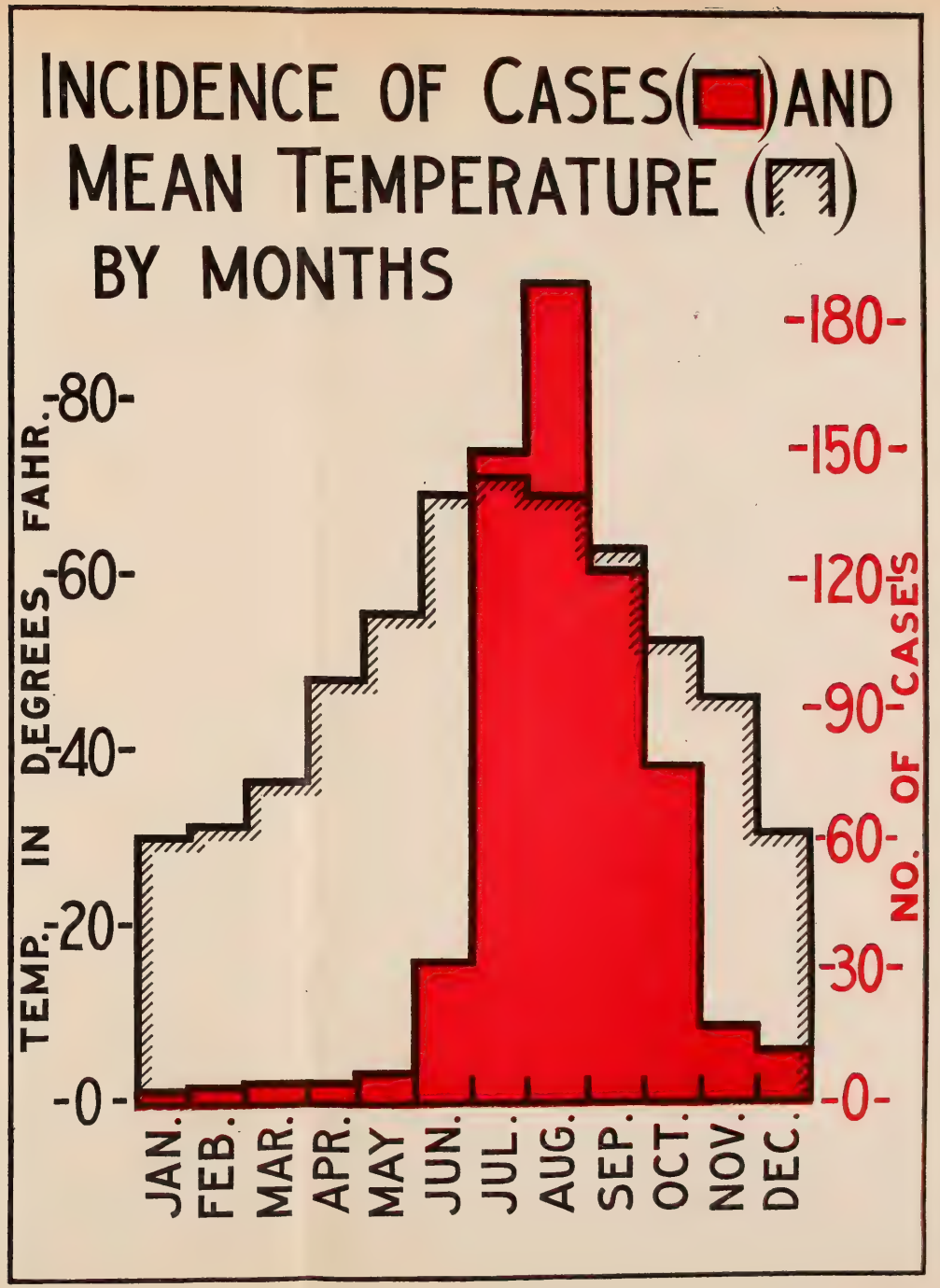
INCIDENCE OF CASES( ) AND
MEAN TEMPERATURE ( )
BY MONTHS
TEMP. IN DEGREES FAHR.
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20
40
60
80
NO. OF CASE'S
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30
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90
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150
180
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SURROUNDINGS OF PATIENTS.

The following tables relate to the environment of the patients in the 150 cases carefully studied, and are largely self explanatory.

The nearness of the house to the railroad was investigated on account of the data of certain Swedish observers, showing its frequency in these localities. Even in a district where railroads were frequent the bulk of the cases were well removed from the tracks.

NEARNESS OF HOUSE TO RAILROAD.

On	7
Within 20 yards	4
Within 40 yards	4
Within 100 yards	17
Within 200 yards	22
Within 300 yards	13
Within 500 yards	37
Over 500 yards	46
	150 cases.

NEARNESS TO WATER.
(*Stream, Pond or Beach.*)

	HOUSES.
Within 50 Yds.	6
" 100 "	27
" 200 "	21
" 300 "	8
" 400 "	10
" 500 "	7
" 600 "	5
" 700 "	1
" 800 "	9
Over 800 "	56
	150 cases.

Analyzing the age of infected houses, it is evident from the table given below that most of the 150 cases occurred in old houses. Yet the majority of houses in a city are old.

But in Dorchester, where many cases were investigated, building is active, and many of the houses are new. It seemed as if the average age of infected houses was probably higher than that of the houses of those districts taken as a whole.

AGE OF HOUSE.

	HOUSES.
1 year old	2
1½ years "	1
3 " "	5
4 " "	3
5 " "	4
10 " "	28
15 " "	24
20 " "	17
30 " "	22
+30 " "	44
	150 cases.

SANITARY CONDITIONS IN 150 CASES.

Excellent	36
Good	50
Fair	37
Bad	19
Not stated	8
Total,	150 cases.

LOCATION OF HOUSE.

High	43	150 cases.
Medium	65	
Low	42	
Dry	105	150 "
Damp	45	

CHARACTER OF HOUSE.

Detached House	64
Tenement House	86
	150

FLOOR OF HOUSE INHABITED BY FAMILY.

The whole house	55
" first floor (3 of which also occupied basement)	43
" second floor	36
" third floor	20

CHARACTER OF SEWAGE DISPOSAL.

Sewer	Metropolitan	109
	City	19
	Cesspool	13
	Vault	8
	Privy	1
		150 cases.

CHARACTER OF WATER SUPPLY.

Metropolitan	109
Town	17
City	22
Well	2
	150 cases.

The amount of dust as described by the families may be taken at its face value, the majority of cases reporting from a moderate amount upward.

RELATION TO DUST.

No dust	0
Very little dust	29
Moderate amount of dust	83
Much dust	37
Excessive amount of dust	1
	150 cases.

PREVALENCE OF VERMIN, INSECTS AND RODENTS.

Inasmuch as the disease in many respects suggests that it is insect-borne, the following table was compiled from the account of the family aided by the observation of the investigators. It may be added that the investigators were

fully aware of the importance of obtaining accurate answers to this question.

Among 142 families, 134 had vermin, etc., as follows:

Flies	were present	in	113	families.
Mosquitoes	"	"	"	75	"
Mice (house)	"	"	"	63	"
Rats	"	"	"	54	"
Ants (red and black)	"	"	"	35	"
Roaches	"	"	"	35	"
Bedbugs	"	"	"	31	"
Spiders	"	"	"	28	"
Mice (field)	"	"	"	20	"
Squirrels	"	"	"	6	"
Biting flies	"	"	"	3	"
Grubs and caterpillars	"	"	"	3	"
Fleas	"	"	"	2	"
Brown tail moth	"	"	"	1	"
Moles	"	"	"	1	"

Paralysis in Domestic Animals.

The occurrence of paralysis among domestic animals and fowls has been found to coincide with outbreaks of the disease in the human beings in some instances reported. Inquiries were therefore addressed to every veterinary surgeon and every animal inspector in Massachusetts as to the occurrence of such paralysis in animals in 1909. The reported cases were then carefully laid off on a map of the state and the relative distribution of the animal cases compared with that of the human cases. No correspondence was found to exist, so that so far as these data can be depended on no obvious connection on the whole existed between the two classes of cases in Massachusetts in 1909.

The health of the domestic animals in the 142 families is shown in the table. In 34 out of 87 families having domestic animals, sickness, paralysis or death occurred in these animals about the time of the paralysis in human beings.

The relation of this disease to paralysis in domestic animals is however a matter requiring much more extensive investigation, and is at present wholly unknown.

DATA AS TO DOMESTIC ANIMALS.

No animals of any kind in 55 families.
Animals in . . . 87 "

Total, 142 "

(*a*) 22 homes had 28 dogs without sickness.
53 " " 73 cats " "
11 " " 760 hens " "
9 " " 17 birds " "
7 " " 11 horses " "
1 " " 20 cows " "
1 " " 3 pigs " "
1 " " 1 lamb " "

(*b*) 3 homes had 3 dogs with sickness.
10 " " 10 cats " "
4 " " 6 hens " "
1 " " 1 bird " "

(*c*) 2 homes had 2 cats with paralysis.
3 " " 4 hens " "
1 " " 1 dog " "

(*d*) 4 homes had deaths in 5 cats.
4 " " " " 4 hens.
1 " " " " 2 rats.
1 " " " " 1 dog.

18 homes had illness in 20 animals.
6 " " paralysis in 7 "
10 " " deaths in 12 "

Total, 34 homes had illness, paralysis or death in 39 animals.*

* The following letter which reached the Board through the State Board of Health of Minnesota is of possible interest in this connection:
"In my veterinary practice during the past five or six years, I have

RELATION TO RABIES.

The relation of the disease to rabies was investigated and in three of the towns carefully studied, epidemics had occurred in the past, but no outbreak of rabies in 1909 had any relation to these 150 cases of paralysis, and no one of the 150 paralyzed children had in the past received the Pasteur treatment.

COMMUNICABILITY.

With regard to evidences of communicability in our series of cases it seems proper that in so important a matter our conclusions should only be presented after a very careful study of all the facts.

We have had instances of direct contagion from child to child with an incubation period of 1 to 14 days. We have had a number of instances of what appeared to be indirect contagion by a healthy carrier, and finally we have had 11 instances in the 150 cases where the disease followed

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found a disease appearing among one and two years old colts that shows a line of symptoms corresponding very closely to *anterior polio myelitis* of children. I have had from five to ten cases a year during this time, the cases always occurring during the summer months, and the majority of them during the month of August. The affected colts are usually found in the pasture, unable to stand. The owner sometimes will notice an unsteady gait for twenty-four hours before entire loss of motion occurs. At first, these colts have a rise of temperature ranging from 103 to 104 degrees, Fahrenheit; pulse and respiration accelerated; animal sweats profusely; appetite remains fairly good, but there is some trouble noticed in swallowing, especially water; slight derangement of the bowels, tending toward constipation; more or less tympanitis present; retention of urine —for a few hours at least; head drawn back so the end of the nose tends to assume a position somewhat on a line with the neck. The death loss is less than ten per cent., but in those that do recover the market value is depreciated to a very great extent, because of the faulty gait the animal assumes after an attack of this disease, due to atrophy and contraction of certain muscles, or certain groups of muscles. It seems that the flexor muscles of the limbs especially are more often affected than the extensor, and in almost all the cases some of these deformities are likely to remain permanent. The flexors of the limbs are liable to contract and cause volar flexion of the fetlock. The elevators of the head are also likely to become affected, so as to cause the head to have a pokey appearance; that is, it is carried out from the body.

After one of these attacks, the colt will remain down from one to three weeks, and will then continue to improve for a period of one year but seldom, if ever, makes a complete recovery. DR. C. S. SHORE.

Lake City, Minnesota."

intimate contact with persons with old infantile paralysis, often of many years' standing. The latter cases seemed to be unworthy of mention in a serious report, but after consultation with our Advisory Board it seemed worth while to allude to the matter for what it is worth; *e. g.*, a child of 2½ was not, so far as known, in direct or indirect contact with any acute case, but was, previous to his attack, daily fondled and cared for by a girl of 14 paralyzed 12 years previously. On August 14, 1909, he developed the disease. The Board would not wish to be understood as advocating the view that chronic cases were sources of infection, but the frequency of such histories make it proper to mention the matter as one worthy of following up, although the general history of other diseases caused by a filterable virus would make it seem unlikely.

Instances of what would appear to have been contagion occurred in 35 out of 150 cases. They may be analyzed as follows:

INSTANCES OF CONTAGIOUSNESS.

Certain	direct	contact	with	acute case . . .	14
"	"	"	"	abortive case . .	1
"	"	"	"	chronic case . . .	14
"	"	"	"	both acute and chronic case	2
"	indirect	"	"	acute case by 3d person .	4
				Total,	35 cases.

The contact was so intimate between the cases and so constant that there is no sure means of determining the day of the illness on which the sick child gave the disease to the other, or, in other words, the period of incubation in the recipient.

FAMILIES WITH MORE THAN ONE CASE.

Families with	1 case	134
"	" 2 cases . . .	7
"	" 3 "	1
	Total,	142

CASES AMONG THE ACQUAINTANCES OF PATIENT:

(*a*) In 22 instances there occurred one other acute case, either shortly before or after.

(*b*) In 2 instances there were 2 acute cases each among acquaintances.

(*c*) In 2 instances 4 acute cases each.

(*d*) And in 1 instance there were 6 acute cases.

(*e*) In 13 instances there was one chronic case each among the acquaintances of patient.

It is not demonstrated that contact necessarily took place between these individuals.

As bearing on the question of contagion the places to which visits were made within a month before the attack was investigated.

PLACES VISITED BY PATIENT BEFORE ATTACK.

(*a*)	No history of visits	42	
(*b*)	Revere Beach	38	All these places were known to be infected areas.
(*c*)	City Point	18	
(*d*)	Savin Hill Beach (Dorchester)	15	
(*e*)	Boston	12	
(*f*)	Nantasket	11	
(*g*)	Winthrop Beach	8	
(*h*)	Dorchester Beach	6	
(*i*)	Gloucester	5	
(*j*)	Dewey Beach (Charlestown)	5	

(*k*) 3 other towns were visited by 4 cases each; of these 3 towns, two were known to be infected areas.

(*l*) 8 other towns were visited by 3 cases each; of these 8 towns, seven were known to be infected areas.

(*m*) 10 other towns were visited by 2 cases each; of these 10 towns, seven were known to be infected areas.

(*n*) 40 other towns were visited by 1 case each; of these 40 towns, twenty-five were known to be infected areas.

INSTITUTIONS FOR CHILDREN.

It was suggested by the Advisory Committee that it might be worth while to look into the prevalence of the disease in asylums, etc., where healthy childred lived and were

removed from the ordinary conditions of street life, many of which institutions were in the midst of infected districts. Forty-five such institutions were investigated where 3,600 young children lived. Only one child of the 3,600 developed the disease and this was under such remarkable conditions that the case may be mentioned.

E. R. (age 2 years and 4 months) entered the St. Mary's Infant Asylum in Dorchester on August 28, 1908. In February, 1909, the child had measles and was taken to the South Department of the Boston City Hospital. No other sickness since becoming an inmate of the Asylum.

On Sept. 30, 1909, the child had a typical attack of infantile paralysis; the diagnosis was made by the attending physician and confirmed at the Children's Hospital. Partial paralysis of one leg still persists.

This child is one of a class of walking children in the institution numbering in all 40. At the time of his illness 2 or possibly 3 other children suffered from slight vomiting and diarrhœa. Nothing else remarkable.

This child lived as regular institution children do, playing with his 40 companions on one floor and one porch.

The child never left the institution after he entered save to go to the City Hospital at the time of the attack of measles several months before. No one had visited the child or sent food, toys, etc., for several months before onset.

During the month of September only 6 new children were admitted to that part of the Asylum. None of these had any illness of any sort.

The child, at the time of onset, showed no marks or bites or wounds. His diet was that usually given in an Asylum for children, viz., mashed potatoes, meat juices, soups, bread and milk, oatmeal, and very rarely, fruit. The children sleep 16 in a room and all eat in the same dining hall.

The child was not isolated during his illness and no other cases occurred.

CONDITIONS, GENERAL AND SPECIAL, PRECEDING THE ATTACK.

The general and individual conditions preceding the attack are shown in certain matters in the following tables:

Swimming or Wading.

The frequency with which swimming or wading was mentioned as an antecedent in previous years attracted our attention and was embodied in a question on our blank. Nearly half of the cases had been swimming or wading in water contaminated by sewage shortly before the onset of the disease.

Out of 150 cases, 62 were swimming or wading just before onset.

Water was contaminated by sewage in	54
" " " more or less in	8
	62
No history of swimming or wading in	88
	150 cases.

Exposure to Heat, Cold or Dampness, Preceding the Attack.

To Heat	39
" Cold	25
" Dampness	36
Not exposed	50
	150 cases.

Accident, Fall or Overexertion Preceding Attack.

Cases having no such history	107
" " history of fall	34
" " " overexertion	9
	150 cases.

Diseases Prevalent in Town at Time of Occurence of Infantile Paralysis.

Not known	103
La Grippe	5

Measles	7
Whooping Cough	4
Digestive troubles	8
Rheumatism	3
Mumps	2
Scarlet fever	2
Malaria	2
Tonsilitis	2
Coryza	1
Chicken pox	1
Typhoid	1
Diphtheria	1
	142 families.

DIET.

General — 45 had limited or modified diets.	105
raw cow's milk	120
condensed milk	14
breast milk and other food	14
breast milk alone	0
Fish	80
Fruit	100
Berries	89
Meat	90
Canned goods, (fruits, vegetables or fish)	82
Cereals	15
Bread and butter	23
Vegetables	90
Stews and soups	11
Eggs	14
Tea 2, Cocoa 3, Coffee 1	6
Malted milk	2
Ice cream	8
Predigested and beef juices	4
Candy	2
Bananas	6

Articles of diet are said to have been taken by the affected children as shown in the accompanying table. As many of the cases partook of several kinds of food, the total is much in excess of the total number of cases.

It is important to note that no child living on breast milk alone in the 150 cases carefully studied was affected by the disease.

DATA AS TO SCHOOL ATTENDANCE.

School was not attended by 115 cases.
" " attended by 35* "

150

Of the 35 cases attending school:—

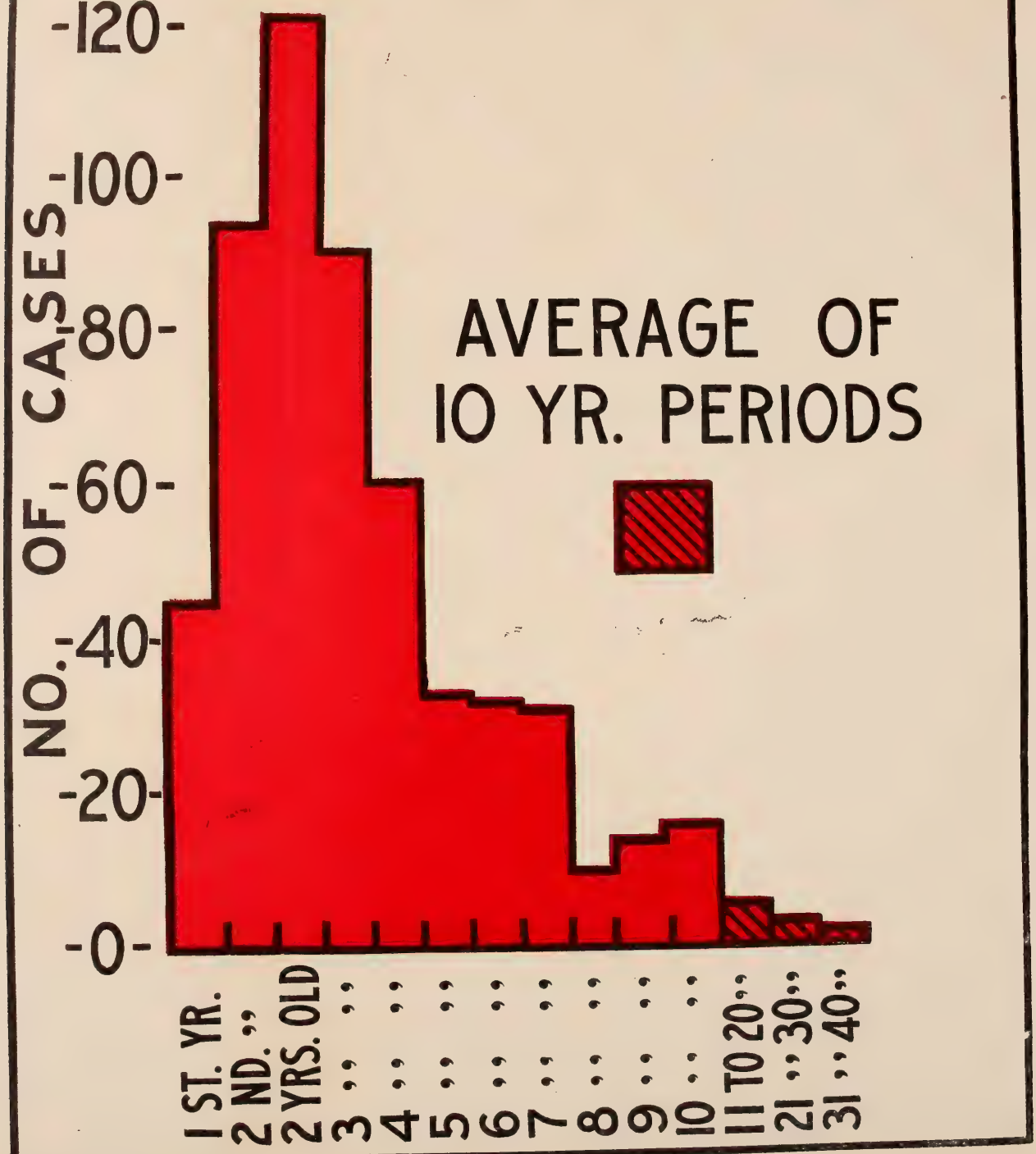
Edward Everett, Dorchester, was attended by	3
Winthrop Primary (including Centre) " "	4
Concord Street, Boston . . " "	2
Savin Hill School . . . . " "	2
Each at a different School . .	22
School unknown	2
	35 cases.

POSSIBLY FAVORING CONDITIONS PRECEDING OR ATTENDING INFECTION.

Insect Bites or Stings	35
Wounds	13
Sore Throat	42
Diarrhœa	35
Otitis Media	2
Coryza	4
Measles	1
Pin worm	1
Bronchitis	1
Of the above possible sources of infection one or more were present in	93
There was no such history in . . .	57
	150 cases.

* School attendance was not, however, necessarily continuous up to the time of the attack.

BY AGES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NO. OF CASES
AVERAGE OF
10 YR. PERIODS
1 ST. YR.
2 ND. "
2 YRS. OLD
3 " "
4 " "
5 " "
6 " "
7 " "
8 " "
9 " "
10 " "
11 TO 20 "
21 " 30 "
31 " 40 "

INCIDENCE OF THE DISEASE.

Sex.

363 males and 263 females were affected.

Age.

By the figures it is seen that the incidence is greatest between the ages of two and three. After ten years of age the chart deals only with ten-year periods and the average number of cases per year only is represented.

In the chart of age periods it is shown that only 7% of cases occur in the first year of life, but 71% of cases occur in the first five years, and 87% of cases in the first ten years.

By Ages.

Age.	Cases.	Age.	Cases.
3 weeks	1	8 years	9
2 mos.	2	9 "	13
3 "	1	10 "	15
4 "	1	11 "	5
5 "	2	12 "	9
6 "	2	13 "	4
7 "	2	14 "	11
8 "	5	15 "	2
9 "	3	16 "	3
10 "	3	17 "	2
11 "	6	18 "	1
12 "	16	19 "	7
13 "	5	20 "	2
14 "	11	21 "	4
15 "	3	22 "	5
16 "	12	23 "	3
17 "	5	25 "	3
18 "	22	27 "	1
19 "	6	28 "	1
20 "	12	29 "	2
21 "	12	30 "	2
22 "	5	33 "	2
2 years	121	34 "	1
3 "	90	35 "	2

Age.	Cases.	Age.	Cases.
4 years	60	40 years	2
5 "	32	41 "	1
6 "	31	62 "	1
7 "	30	72 "	1
Not stated	13		
Total	628		

By Age Periods.

			New York.*
From birth to 12 mos., inclusive,	44 = 7.15%		62
1 year old	93		221
2 years old	121		180
3 years old	90		106
4 years old	60		63
5 years old	32	71.54%	28
Total	440		
6 to 10 years, inclusive	98	87.48%	47
Total	538		
11 to 20 years, inclusive	46	94.96	19
Total	584		
21 to 30 years, inclusive	21		2
31 to 72 years, inclusive	10		1
Not stated	13		23
Total	628		752

Mortality.

The average total death-rate in 628 cases was 8%. The mortality was greatest over 10 years of age, reaching 20% in that period. Under 1 year the mortality was also high—16%; between the ages of 1 and 10 being lowest—4%.

MORTALITY BY AGE.

Age.	Cases.	Deaths.	Mortality Per Cent.
Under 1 year	44	7	16
1–10 years	494	20	4
Over 10 years	77	16	20
Not stated	13	8	
Total	628	51	—
Average mortality	—	—	8

* For purposes of comparison the New York figures are included.

EARLY SYMPTOMS.

Cases	150
Cases	3 not stated.
	147

Symptoms reported in 147 cases:

Fever	132	Dyspnœa	4
Pain	110	Sore throat	8
Tenderness	108	Numbness	3
Vomiting	67	Chills	2
Constipation	72	Weakness	1
Retraction of head	60	Coma	2
Diarrhœa	38	Abdominal distension	7
Headache	33	Pain in abdomen	1
Delirium	15	Jaundice	1
Anorexia	15	Vertigo	2
Irritability	24	Double vision	2
Stupor and restlessness	14	Difficulty or inability to swallow	4
Malaria	9	Difficulty in articulation	2
Nausea	18	Gastro-intestinal upset	2
Convulsions	4	Diaphragmatic breathing	1
Twitchings	3	Coryza	1
Cough	8		

6 cases had skin eruptions.
1 measles and mumps.
1 whooping cough.
1 malaria.

DETAILS OF DIGESTIVE DISTURBANCES CONNECTED WITH ATTACK.

(*a*) Not stated . . . . . 9 cases.
(*b*) Having no digestive disturbance 15 "
(*c*) With digestive disturbances tabulated as follows:

(c, 1.) Preceding attack:

Indigestion or stomach "upset"	4 cases.
Nausea and vomiting	37 "
Constipation	31 "
Colic	2 "
Diarrhœa	12 "
Mucus in stools	2 "

(c, 2.) Accompanying attack:

Indigestion (indefinite)	3 "
Nausea and vomiting	51 "
Constipation	55 "
Colic	8 "
Diarrhœa	24 "
Mucus in stools	1 "

(c, 3.) Following attack:

Nausea and vomiting	4 "
Constipation	37 "
Colic	2 "
Diarrhœa	10 "
Mucus in stools	2 "

Disturbances of Intestines during Attack.

No disturbances in	53
Constipation	63
Diarrhœa	22
Involuntary defecation	4
Constipation, later diarrhœa	4
Diarrhœa, later constipation	4
	150 cases.

Disturbances of Bladder during Attack.

No disturbance	114
Retention	23
Frequent micturition	3
Incontinence	9
Retention, later incontinence	1
	150 cases.

Pain and Tenderness.

The frequency of pain and tenderness, sometimes local, sometimes pretty general, is not sufficiently regarded as an early and persistent symptom. The accompanying table is presented to emphasize the point that it occurred in 420

and was absent in only 82 out of 502 cases in which its presence or absence was noted.

Pain or tenderness was present in		420
" " "	" absent "	82
" " "	not stated "	126
	Total, . . .	628 cases.

The pain or tenderness lasted:

No pain	82
1 day or less	7
2 days	16
3 days	22
4 days	11
5 days	10
6 days	3
A few days	13
1 week	47
1 to 2 weeks	75
2 to 3 weeks . . .	36
3 to 4 weeks . . .	26
1 to 2 months . . .	28
2 to 3 months . . .	5
Several months . . .	3
Until death	11
Present when report was made	107
Not stated	126
Total, . .	628 cases.

APPEARANCE OF PARALYSIS IN DAYS AFTER ONSET OF FEVER.

Same day	30
1 "	36
2 "	27
3 "	23
4 "	14
5 "	7
6 "	5
7 "	1
8 "	1

11 days	1
12 "	1
14 "	2
16 "	1
Not known, fatal	1
	150 cases.

Distribution of Paralysis.

The distribution of paralysis is shown in the table. It is interesting to note hat when one arm and leg are paralyzed a hemiplegic distribution is more common than a crossed paralysis, and the frequency of facial paralysis is worthy of note.

One leg only	192
Both legs only	151
One arm only	32
Both arms only	11
One arm and leg, same side	57
One arm and leg, opposite sides	17
Both legs and one arm	38
Both arms and one leg	6
Both arms and both legs	82
Not stated	12
Back	83
Abdomen	37
Face	8
Right face	16
Left face	10

PROGNOSIS.

Recovery Rate in 628 Cases.

In answer to the question "Has paralysis entirely disappeared?" the replies were as follows:

Yes	62	10.8 %
No	404	
Partially	61	
Death	51	
Not stated	50	
Total	628	

This table is intended to emphasize the fact that what appears to be recovery in the eyes of the family physician occurs more frequently than is generally supposed, 10% of such cases being reported. This led to a closer investigation of the recoveries in the 150 cases carefully investigated, and it was reported by the investigators that 25 of these (16.7%) had wholly recovered. This report was not accepted and the investigators were sent again to these children, and each child was stripped naked and the separate movements of ankle, knee, hip, spine, abdomen and arms were separately tested. From this careful examination it is sure that 25 children out of 150 have recovered since the disease in 1909. The following tables deal only with these 25 cases:

Age of 25 Recovered Cases.

So far as one may generalize from these few cases it would seem that the average age of the children was higher than in the cases in general.

Age.	Cases.
1 year	3
2 "	1
3 "	5
4 "	5
5 "	2
6 "	4
7 "	1
9 "	1
10 "	1
14 "	1
21 "	1
Total	25

Onset.

The character of the onset was mild in 6, moderate in 17, and severe in 2.

Evidence of Paralysis.

The presence of paralysis in the beginning is vouched for by the attending physician in 23 cases and by the family

in 2; and the distribution of paralysis was on the whole fairly extensive, as shown by the table.

Extent of Paralysis in 25 Recovered Cases.

One thigh and leg	4
Both thighs and legs	8
Both thighs	1
One leg	2
One arm	1
One leg, arm and back	1
One leg and back	1
One thigh, leg, arm and forearm	1
One arm, forearm and cervical region	1
Cervical region	4
Indefinite staggering gait	1
Total,	25

The extent of the paralysis therefore did not differ essentially from that of the whole group presented above.

Duration of Paralysis in 25 Recovered Cases.

Time.	Cases.	Time.	Cases.
3 days	2	8 weeks	8
1 week	3	12 "	4
2 weeks	3		
3 "	2	Total,	25
4 "	3		

Tenderness in Recovered Children.

It was thought that such cases being slighter might show less tenderness in the acute stage, but the tenderness was about as frequent as in the severer cases.

Pain or tenderness in the acute attack existed in 19 out of 25 recovered cases.

Duration of Tenderness.	Cases.	Duration of Tenderness.	Cases.
2 days.	1	3 weeks	1
3 "	1	4 "	3
7 "	6	6 "	1
10 "	1	8 "	2
2 weeks	2	12 "	1

The statement may, therefore, be made that in the whole group of 628 cases, 10.8% were reported as wholly recovered; that in the smaller group of 150 cases, 16.7% are known to have recovered, and that a study of the character of onset, distribution and tenderness in these cases gives no means of distinguishing them from other cases at the time of the attack.

PREVENTION.

In the matter of prevention of the disease in Massachusetts, in November, 1909, it was made one of the notifiable diseases like scarlet fever, etc. In a recent circular addressed to physicians it has been advised by the Board that such cases should be quarantined, and that urine, stools and sputum should be disinfected, and we have called attention to the existence of abortive cases as probable sources of contagion.*

CONCLUSIONS.

These data are presented as a report of progress in an investigation which will be continued, and no conclusions are drawn from them.

That the effort of the State Board meets with general approval is shown by the fact that the following resolution was adopted in Washington on May 5, 1910, by the American Orthopedic Association and the American Pediatric Society:

"It having been shown by recent epidemics and investigations connected with the same that epidemic infantile spinal paralysis is an infectious, communicable disease, which has a mortality of from 5 to 20%, and that 75% or more of the patients surviving are permanently crippled; State Boards of Health and other health authorities are urged to adopt the same or similar measures as already adopted and enforced in Massachusetts for ascertaining the modes of

* In a recent communication Flexner and Lewis report that a one per cent. solution of peroxide of hydrogen in perhydrol has been found to destroy the virus. In view of their belief that the entrance of the virus is probably by the respiratory tract, the use of a nasal douche of this character would seem advisable.

origin and manner of distribution of the disease with a view to controlling and limiting the spread of so serious an affection."

What the course of the disease may be in 1910 in Massachusetts cannot be predicted. It would be expected from the history of the disease that a year of comparative immunity in the State as a whole would follow the great prevalence of the disease in 1909, and it is, therefore, disappointing to find 22 cases reported in the first five months of 1910 as against 15 cases for the same five months in 1909. Whether this means merely an increased attention on the part of the profession or a really increased prevalence of the disease, time alone will show.

The object of the inquiry in 1910 will be two fold.

First, the formulation and classification of early symptoms and types of the disease with especial reference to early diagnosis, and second, a study of the conditions under which contagion seems to occur with a continued search as to the mode of entry of the virus into the body.

The medical profession must remember that the Board of Health acts only as the agent of the profession in assembling the data provided by them, and depends on them for the same willing coöperation that it has met and is profoundly grateful for in the past.

The report for 1910 will be what the profession makes it, and the Board is anxious not only for the prompt and full report of typical cases, but also for notification of suspicious and atypical cases which are possibly of the abortive type and a most important link in the chain of evidence.

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ARTICLE XXXIX.

THE DIAGNOSIS OF INFANTILE PARALYSIS IN THE PRODROMAL AND EARLY ACUTE STAGE AS FOUND IN THE EXPERIMENTAL STUDY OF ACUTE POLIOMYELITIS IN MONKEYS, WITH REPORT OF FINDINGS IN FOUR HUMAN CASES.

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READ JUNE 8, 1916.

Work done under a grant from the Proctor Fund in the department of Surgical Research and Serum Diagnosis, Harvard Medical School.

THE DIAGNOSIS OF INFANTILE PARALYSIS IN THE PRODROMAL AND EARLY ACUTE STAGE.

The past year has brought out so many interesting facts about the infectious nature of acute anterior poliomyelitis, its transmissibility, its epidemology, and recently, some valuable facts in experimental immunity, that now great efforts are being made to discover some means of protection. In view of such a discovery, and having failed thus far to find the specific etiological cause, it seems of some import to find some means of making a fairly accurate diagnosis early in the disease as there is little or no hope of being able to check the process after paralysis has appeared. The invasion of the white matter of the cord is undoubtedly an end result of the acute process, so that when the paralysis is first observed the virus has already about spent itself. This being so, there must be some indication in almost every case that the virus is at work sometime before the paralysis appears.

The New York investigation of the prodromal symptoms agrees completely with the early symptoms found in animal experimentation. The most noteworthy signs are those of change of disposition. At times slight, but fairly constant and characteristic, is the restlessness and irritability that often appears several days before any other symptoms. Or the other extreme of apathy may be moderately marked for a number of days before one is aware that the paralysis is present. In these cases the occurrence of paralysis is much harder to determine, or, at least, we are not so apt to notice it as early as in the irritative cases. The paralysis may even be ushered in with delirium and convulsions or epilep-

tiform attacks which may last for several days before the paralysis is noted. In the exceedingly irritative cases the diagnosis of epidemic meningitis is most often made. And indeed it is really a distinct type of acute meningitic anterior poliomyelitis. Experimentally it is hard to be sure of pain, but pain in the prodromal stage is by no means an uncommon finding, most often in the back along the spine, or in the joints of the extremities, which may show swelling and tenderness. Headache, general or frontal, is not infrequently met with in children old enough to locate the pain and this is often accompanied with rigidity of the neck. If with any of these nervous manifestations, there should be any trouble in the upper air passages, as coryza, bronchitis or sore throat, suspicion should at once be aroused. In all of our animals and in each of our four human cases, there was some affection of the upper air passages along with one or more of the above nervous manifestations. Temperature, though present in nearly every case, is not typical and is of little use as a guide. It is usually of short duration, two or three days, though a low temperature of about 100° may continue for a week or more as may be seen in our four cases, in three of which it persisted for over three weeks. The bowels show no particular change in the majority of cases though either constipation or a moderate diarrhœa may exist.

These clinical manifestations, in conjunction with certain definite laboratory findings which I have been able to show in an experimental study and in a few human cases that I had the good fortune to see about the same time, make the diagnosis somewhat more certain, though of course not as exact as some specific reaction by which we had hoped to be able to make a positive diagnosis but in which so far we have failed. Yet this combined information should be of great assistance toward making a more accurate and early diagnosis in this condition.

Points in Diagnosis from Spinal Fluid and Blood in the Prodromal and Acute Stages of Anterior Poliomyelitis from Animal Experimentation and Human Study.

The original material for experimental work was obtained through the kindness of Dr. Flexner who furnished us with two different strains of virus. We were able to produce paralysis in three monkeys from this original virus, and were able to transfer paralysis through two subsequent series of inoculations. The work of diagnosis may be divided into two parts as we carried them out. First the ordinary laboratory methods of blood and spinal fluids examination, and secondly the more complicated bioglogical tests of these same fluids. All these tests were made before the inoculation in a large enough number to give us a fair idea of what normal findings were. These same tests were carried on during the period of incubation, through the prodromal stage, and through the acute stage until the fluids examined returned apparently to their normal findings. The temperature findings were not constant except that in the first irritative stage there was a fairly uniform rise with a drop to normal, often sub-normal during the acute stage, with at times a further rise toward the end of the acute stage or beginning of convalescense.

The study of the blood brought out at least two very interesting facts, and when taken in conjunction with certain findings in the spinal fluid will certainly make a strong diagnostic point early in the disease. The normal differential count ran about—polynuclears 60%, large and small mononuclears 25%, lymphocytes 12%, eosinophiles 3%. In the acute stage there was a moderate to a constant lymphocytosis and an eosinophilia, the count being polynuclears 40%, large mononuclears 15%, lymphocytes 40%, eosinophiles 5%. Parallel with this lymphocytosis there was a marked and constant leukopenia. This drop in the white count lasted fairly consistently with the acute stage, disappearing about the time that the hyperæsthesia or other

manifestations of the acute stage disappeared. The average normal count of our monkeys was in the neighborhood of 20,000 per cubic millimeter. This count did not change during the incubation period, but did change occasionally during the irritative or prodromal stage when there was a marked or moderate drop in the white count. During the acute stage there was always a marked drop, the lowest count being 8000 on the second day after paralysis was first noted.

SPINAL FLUID.

The spinal fluid shows even more marked and very characteristic constant findings during the incubation period, prodromal, and acute stage, disappearing about the time that the acute symptoms begin to subside, being at its height either in the prodromal stage or on the first or second day of the acute stage. Before inoculation it is often impossible to get even one drop of spinal fluid from a lumbar puncture; most of our attempts gave nothing more than dry taps. However, when successful, there were only one or two cells to be seen in an ordinary Thoma-Zeiss counting chamber, and on staining, these were apparently large mononuclears or plasma cells. During the incubation period there is a marked increase in the amount of fluid that may be obtained from lumbar puncture and the cells in the fluid are very markedly and characteristically increased; anywhere from 100–300 cells per cubic millimeter. These cells are mainly of the large mononuclear type with some polynuclear cells and lymphocytes. In the prodromal stage there is even a more marked increase in the cells, often reaching 1000 per cubic millimeter. In this stage also polynuclears are still present, in some cases as high as 60%, though the large mononuclears and lymphocytes were very evident. In the early acute stage the increase in cells is very marked. The cells are now, however, mostly of the lymphocytic or very early form of cells, and sometimes very hard to place, as

they are apparently undifferentiated cells. As the cells decrease in number the polynuclears begin to return, and at the end of a week or ten days there are very few cells present, mostly large mononuclears with a few polynuclears. In the prodromal and acute stage there was at times a fibrin clot. This clot would disappear fairly early during the acute stage. Fluid in our monkeys was never under any great pressure though the amount was sometimes increased so that 5 c.c. was easily withdrawn. This occurred fairly regularly in the meningeal type of the infection.

A comparison of these experimental findings with the findings in four cases of acute poliomyelitis in children is of considerable value. These four cases were seen first between the second and fifth day of the acute onset. When seen all of them were running a slight temperature and were still in the hypersensitive state with paralysis just commencing, so that the first findings in these cases are comparable with our findings in the early acute stage of our experimental studies. It will be seen from the chart that the blood findings show from a moderate to a quite marked drop in the white blood count with a lymphocytosis moderately marked in all but one of the cases, which was the one examined at the latest day. The spinal fluid findings are very interesting in all these cases, for the fact that in two of them definite fibrin formation was present early, which disappeared rapidly in one and very slowly in the other. The increase in cells was marked in all at the first puncture, and in three of the cases increased slightly later on in the course of the acute stage. The increase of cells was still present in two cases as late as the twentieth day of the acute onset. The type of cells found was practically parallel with the findings of the experimental spinal fluids, the lymphocytes and small mononuclears predominating on the first examinations, later being replaced by large mononuclears, and in the last findings polynuclears were beginning to reappear.

Table 1.

Noteworthy Prodromal Symptoms.

1. Irritability.
2. Restlessness.
3. Pain in Spine or Extremities.
4. Apathy.

Table 2.

Important Symptoms during Acute Stage.

1. Fever 100° to 106°. Duration of fever 2 to 7 days.
2. Vomiting (25 per cent. in New York series).
3. Restlessness.
4. Apathy.
5. Rigidity of neck.
6. Headache (frontal).
7. Delirium.
8. Stupor.
9. Convulsions.
10. Photophobia.
11. Dysphagia.
12. Sluggish pupils.
13. General pain (early in 58 per cent.).
14. Absence of deep reflexes.
15. Cold extremities (vasomotor changes).

Table 3.

Types of Acute Poliomyelitis (Wickmann).

1. Spinal Poliomyelitic Form.
   Sudden onset followed by paralysis.
2. The Ascending Form (Landry's Paralysis).
   Involvement of respiratory centres.
   Most fatal cases belong to this type.
3. The Bulbar or Pontine Form.
   Nerves most often involved: Facial, Ocular, Hypoglossal.
   May exist alone or with paralysis of extremities.
4. Encephalitic or Cerebral Form.
   May exist alone or with spinal involvement.
5. The Ataxic Form. Much like Frederick's ataxia.
6. Polyneuritic Form.
7. Meningitic Form.
8. Abortive Form.
   1. General infection.
   2. Symptoms of Meningeal Irritation.
   3. Cases of much pain like influenza.
   4. Cases with marked digestive disturbances.

Table 4.

Intracranial Injections producing Acute Poliomyelitis in Monkeys.

Monkey No.	Material used.	Incubation.	Prodromal symptoms during	Acute Onset on	Died on	Type of Disease.
1.	Virus K. (Flexnor and Lewis) 4 c.c.	7 days.	5 days. 2 days. well.	12th day.	17th day. Chloroformed.	Marked prodromata. Spinal poliomyelitic form.
5.	Emulsion cord (monkey No. 1) 12 c.c.	2 days.	1 day.	4th day.	6th day.	Bulbar, Pontine type Respiratory Paralysis.
7.	Emulsion cord, No. 273, F. and L. 2 c.c.	5 days.	1 day.	7th day.	12th day.	Spinal poliomyelitic form.
9.	Virus M. A. (F. L.) 6 cc.	12 days.	2 days.	15th day.	40th day.	Spinal poliomyelitic form.
12.	Emulsion No 273 (F. L.) 2 c.c.	4 days.	1 day.	6th day.	8th day.	Spinal poliomyelitic form.
15.	Emulsion cord (monkey No. 5), 2 c.c.	7 days.	2 days.	10th day.	10th day.	Meningitic form.
		Av. $6\frac{1}{6}$ days.				

Table 5.

Spinal Fluid in Acute Poliomyelitis (Monkeys).

Monkey No.	Normal.	During Incubation.	Prodromal.	Acute Stage.
1.	2 cells seen. 1 large mononuclear. 1 small? plasma cell.	6th day. 100 cells per cu. mm. Large mononuclears 40%. Small (lymphocytes) 60%.	10th day. 240 cells per cu. mm. Large and small mononuclears 60%. Lymphocytes 40%.	14th day. 400 cells per cu. mm. Mostly lymphocytes. 16th day. 60 cells per cu. mm. Lymphocytes. A few polynuclears.
5.	Dry tap.		3d day. 1000 cells per cu. mm. Polynuclears 60%. Mononuclears 40%.	4th day. 800 cells per cu. mm. 5th day. 1000 " " " " Lymphocytes and polynuclears. Young cells undifferentiated.
7.	No cells seen.		6th day. 160 cells per cu. mm. Excess of large mononuclears.	7th day. 12 cells per cu. mm. Lymphocytes. 8th day. 90 cells per cu. mm. Lymphocytes. 12th day. 20 cells per cu. mm. Large mononuclears. A few polynuclears.
9.	One? plasma cell.		14th day. 120 cells to cu. mm. Lymphocytes 40%. Large mononuclears 60%.	16th day. 200 cells per cu. mm. All lymphocytes or small mononuclears (young cells).
12.	Dry tap.			7th day. 80 cells to cu. mm. Lymphocytes.++
15.	A few large cells and 1? plasma cell.	6th day. 300 cells to cu. mm. Large mononuclears 50%.	9th day. 150 cells to cu. mm. Large mononuclears 30%. Lymphocytes 60%. Polynuclears 10%.	10th day. 180 cells per cu. mm. Lymphocytes.++ 30th day. Few polynuclears found.

Table 6.

Blood (W. B. C.) in Acute Poliomyelitis. (Monkeys).

Monkey No.	Normal.	During Incubation.	Prodromal.	Acute Stage.
1.	W. B. C. 20,000.	Average W. B. C. 23,000.	11th day. 21,000.	12th day. 19,000 (1st d.). 14th day. 12,000 (3d d.). 15th day. 11,800 (4th d.). 16th day. 16,000 (5th d.).
2.	21,000.	2d day. W. B. C. 21,400.	3d day. 22,400.	4th day. 14,000 (1st d.). 5th day. 19,000 (2d d.).
7.	40,000.	2d day. W. B. C. 16,000.	6th day. W. B. C. 19,800.	7th day. 13,000 (1st d.). 8th day. 8,000 (2d d.). 12th day. 13,000 (6th d.).
9.	21,000.	Average, W. B. C. 19,000.	14th day. W. B. C. 13,000.	15th day. 14,000. 16th day. 9,000. 20th day. 12,000. 24th day. 19,400.
12.	23,000.	2d day. W. B. C. 23,200.	4th day. 23,000. 5th day. 18,000.	6th day. 18,000 (1st d.). 7th day. 12,200 (2d day).
15.	20,000.	2d day. 48,000. 7th day. 39,000.	9th day. 19,000.	10th day. 9,400 (1st d.). 12th day. 11,800 (2d d.).

Table 7.

Case I.

Day.	Temp.	Blood.	Sp. Fluid.
5th.	100.	W. B. C. 17,400. Dif. Lymphocytosis.	10 c.c. 180 cu. mm. No clot. Lymphocytosis 98 %.
8th.	100.	W. B. C. 12,000. Lymphocytosis.	20 c.c. 50 cu. mm. No clot. Mononuclears degenerated forms.
13th.	99.	W. B. C. 11,600.	10 c.c. 50 cu. mm. No clot. Large mononuclears and degenerated forms.

Case II.

Day.	Temp.	Blood.	Sp. Fluid.
2d.	100.	W. B. C. 10,000. Lymphocytosis 62%.	5 c.c. clear clot in 24° 350 cells per cu. mm. Degenerated mononuclears.
5th.	98.5.		Blood fluid with clot+20 c.c. Very few leucocytes.
7th.	100.	W. B. C. 7,800. Sl. lymphocytosis.	35 c.c. bloody fluid clot+. Few degenerated mononuclears.
9th.	99.5.	W. B. C. 12,200.	
12th.	100.	W. B. C. 11,800.	30 c.c. 1st lot clear sl. clot. 80 cells to cu. mm. Mononuclears+. 3d lot opaque. Clot+.580 cells to cu. mm. Mononuclears and lymphocytes.

Case III.

4th.	101.	12,000. Normal dif.	50 c.c. clear. No clot. High pressure. 60 cells per cu. mm.
	100.		25 c.c. clear. 510 cells per cu. mm. Mononuclears and lymphocytes.
			10 c.c. clear. 240 cells per cu. mm.

Case IV.

4th.	99.	13,400. Dif. Polynuclears 75.5. Mononuclears 24.5.	20 c.c. clear. Fibrin clot+ 50 cells per cu. mm. Degenerated small and large mononuclears.
5th. 9th.			30 c.c. clear fluid. 130 cells per cu. mm. Mononuclears and lymphocytes.

ARTICLE XL.

THE CLINICAL ASPECTS OF ARTERIOSCLEROSIS.

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READ JUNE 7, 1910.

THE CLINICAL ASPECTS OF ARTERIOSCLEROSIS.

THE subject of arteriosclerosis is one that interests us all in that it represents a condition that all of us who live long enough must sooner or later come to. The etiology is obscure and the pathologic processes dependent upon the condition are most varied. Clinically, the symptoms are as varied as are the pathologic processes which may result from changes in the vessel walls.

The marked changes in the larger vessels were recognized by the older anatomists and clinicians, but the importance of these changes was not appreciated until a comparatively recent time, some forty years, or until the work of Gull and Sutton in 1871-72. These authors were the first to recognize the important rôle in the etiology of disease played by fibrous changes in the walls of the smaller arteries, their so-called arterio-capillary fibrosis. For instance, Walshe, in his book, "Diseases of the Lungs and Heart," published in 1851, says, "Atheroma and calcification of the aorta, conditions of great anatomical interest, have in themselves but little importance." Also in his discussion of the cause of angina, though he expresses the opinion that there must be some organic cause for the trouble, he does not mention the rôle of changes in the vessels as causative of the disease.

Pathologically, we find changes in the elastic tissue of the vessels, in the media and in the intima. As the changes in the intima are the most prominent features, so this factor was first noticed by the pathologists, and we find in the older books of pathology an accurate description of changes which

have taken place in the intima, as atheroma, calcareous degeneration and colloid changes. These changes were well recognized before the changes in the smaller vessels were known, and when but little clinical significance was attached to atheroma of the aorta, for instance. It is now known that the primary process is found either as a degenerative or as an inflammatory change in the media, or perhaps some defect or strain of the elastic fibres. The marked and long recognized changes in the intima, on the other hand, represent a conservative process, a protective cement, so to speak, to guard against injury of the arterial wall because of the disease in the media. As Dr. Councilman has said, an atheromatous process represents "a degeneration in the media and a growth in the intima."

It is to me a deplorable fact that the laity are so conversant with and talk so much about hardening of the arteries without, of course, any idea of the significance of the changes in the specific case under consideration. We are all of us often asked whether we think the arteries are hardened, and in many cases we can truly say, yes, the arteries have changed just as the appearance of the skin has changed, but the arterial change means no more than the hardening of the skin means, a mark of advancing age. I often say to a patient that if a hand were pushed through a sheet he could at once say whether it was the hand of a man of twenty-one or fifty-one years; so the physician can discriminate between the arteries of a man of twenty-one or fifty-one years, though a decision as to the results of such arterial changes is a very complex matter, leading often into regions unexplored and always obscure.

In the sixth volume of the Transactions of the Association of American Physicians, Dr. Councilman published a very valuable article on arteriosclerosis, in which he describes what may be called the clinical-pathologic types of this disease; he makes three divisions.

1. Nodular form, seen especially in the aorta, often of no importance clinically, and usually giving rise to no symptoms, except in the rather rare instances where such a pathologic change is the primary factor in the causation of aneurism.

2. Senile type. In this form the vessels are often calcareous; the heart is small and the liver and kidneys show only the atrophy which accompanies old age.

3. Diffuse arteriosclerosis. This is the type which gives rise to the serious types of disease from a clinical point of view, which is meant when the laity talk about hardening of the arteries. This is the disease which is the cause of many so-called cases of Bright's disease and practically all cases of "cardio-renal" disease.

Of the first, or nodular form, I shall not speak in that it does not give rise to clinical symptoms.

The second, or senile type, is of great interest from the point of etiology; the heart is not enlarged. Clinically, we often see arteries which feel like broken pipe-stems, and so hard that it seems as if they would crack if they were out of the body. We find these conditions in the very old, in people who are essentially well except for such ills as are dependent upon general debility of a senile type. The heart is often extremely intermittent and irregular, yet does not show the results of heart failure as evidenced by edema of the extremities, by congestion of the liver or kidneys, or even chronic bronchitis with varying grades of pulmonary edema. It is not my experience that such individuals are especially subject to apoplexy or other diseases which could be attributed to the diseased condition of the arteries.

It is hardly conceivable that the same etiologic factors underly this form of arterial disease as are considered the probable cause of diffuse arteriocapillary fibrosis. It certainly suggests that in the latter type there is some toxemia, as yet undetermined, which is a powerful factor in the pro-

duction of the widespread diffuse fibrous degeneration of the arteries seen in the third and all important type of diffuse arteriosclerosis.

Yet in the senile type we find many symptoms probably directly attributable to the condition of the arteries, rather local disturbances in the circulation than disease which affects the body as a whole.

The third type of Dr. Councilman, diffuse arteriosclerosis, represents a pathologic condition which is of the greatest importance from its being the direct cause of many very varied pathologic conditions, as it has given rise to much discussion as to its etiology, and as it is the cause of many clinical symptoms or signs as different one from the other as cerebral hæmorrhage, muscular rheumatism and heart disease.

Attention of clinicians was first permanently drawn to this disease by Gull and Sutton in 1872, though their chief attention was directed to the kidney lesions dependent upon arteriosclerosis.

Diffuse arteriosclerosis is a disease found especially and in its most marked type in individuals otherwise healthy, often of robust type and full blooded, who are from forty to fifty years of age; it may be found in much younger people, but it is most common in those advanced in years. The heart is enlarged, weighing on the average 400 gms. or more; in this form of heart disease we find the largest hearts, cases being on record of hearts weighing over 800 gms., when there was no valvular disease. The dilatation of the heart may be so great that all of the valves become incompetent, so that murmurs may be heard at all of the orifices of the heart without the presence of any disease of the valve curtains.

The kidneys are usually diseased as shown clinically by the presence of albuminuria with casts. When the heart is seriously affected, as is seen in so many cases, the question

always arises what signs may be attributed directly to the sclerosis and what to the secondary disease of the heart. From an etiologic point of view many conditions must be considered, though clinically the most satisfactory classification is that of Osler who thus describes three great divisions of arteriosclerosis, namely: "Normal wear and tear of life, acute infection, intoxications and those combinations of circumstances which keep the blood tension high." In the last few years many experiments have been made in the attempt to produce in animals lesions similar to arteriosclerosis in man, but though such experiments have successfully produced types of sclerosis closely allied to certain types of sclerosis in man, most investigators are still in doubt whether the lesions are produced by the artificially increased blood pressure or by some toxic property inherent in the drug used to cause the increased pressure.

In 1889, the first reported animal experiments were made by Lion and Gilbert: they used intravenous injections of bacteria or bacterial toxins to produce sclerosis. In 1902, von Eiselsberg reported similar changes in thyroidectomized animals. In 1905, Pearce and Stanton succeeded in producing definite sclerotic lesions by the use of adrenalin; they used twenty rabbits; nine died from poisoning by the adrenalin, but six of the eleven who survived showed lesions of sclerosis. In one case Pearce and Stanton report their results as follows: "The media is firm, parchment like, and so distinctly calcified that the vessel cracks in several places when the arch of the aorta is straightened." The histologic picture they describe as follows: "The most striking feature of the late histologic picture is the extent of repair in the intima. The latter with its newly formed connective tissue and elastic fibrils becomes so greatly thickened, that it constitutes in some places a quarter to a third of the entire vessel wall and offers convincing evidence of the compensatory nature of the repair process."

These lesions were produced in animals in the course of sixteen to sixty days by injection of adrenalin every other day, a drug which produced a definite rise in blood pressure, but a rise in pressure of very short duration, so that Pearce and Stanton as well as subsequent investigators express doubt whether the pathologic condition was the result simply of the increased pressure or of some toxic substance in the adrenalin acting entirely independently of its power to temporarily increase blood pressure.

Their results are especially interesting as favoring the generally accepted view that the primary disease lies in the media, and that the process so prominent in the intima is secondary and essentially of a conservative nature.

In 1906, J. L. Miller reported the results of his work in the production of sclerosis in animals. He agrees with Pearce and Stanton that the primary disease is in the media and that the intima and adventitia are not involved except in the process of repair, the defects in the wall being repaired by cells arising from the intima. Dr. Miller reviews the various substances used to produce experimental arteriosclerosis as digitalin, nicotine, lead salts, adrenalin, and adds two others, physostigmin and barium chloride. He also considers that the question is not proven whether the exciting cause of the disease lies in the power of the drug to raise the blood pressure or in some toxic property independent of this power.

In 1906, Charles S. Bond, of Richmond, Indiana, made to the Association of American Physicians a most interesting communication from a clinical standpoint as to the etiology of arteriosclerosis. For twenty years he followed the course of 150 cases of chronic indigestion with over indulgence in food, and selected 100 from which to draw conclusions. All cases were omitted in which there was alcoholic excess or a possible chance of syphilis. In these cases there was an excess of food, deficient motor power of

the stomach, and constipation. Thirty per cent. developed arteriosclerosis in a more or less marked degree, five died of angina, six of apoplexy, and four of cerebral hæmorrhage, while the remaining cases were under observation and all showed varying grades of increase of arterial tension and abnormal heart action.

To certain toxic agents we may very surely attribute an important rôle in the causation of arteriosclerosis: alcohol taken in the form of hard liquor and used continuously, though not in quantities to cause intoxication, is from clinical observation a most important etiologic factor. Lead is another, yet neither of these substances raises the blood pressure. Syphilis produces a specific form of disease of the arteries which is recognizable by the pathologist. Experimental work has shown that bacterial toxins may cause sclerosis.

Dr. W. S. Thayer has studied especially the influence of typhoid fever on the arteries. In 52 autopsies he found arterial changes in 30, in 21 of which the lesions were evidently fresh and presumably due to the toxin of the typhoid fever. Also he found changes in the coronary arteries in 62 cases, in 19 of which the lesions were evidently fresh in thirteen.

From experimental and clinical observations it seems probable that we must attach greater importance to the rôle of varying toxic processes associated with acute infectious diseases in the etiology of arteriosclerosis. Yet the chief cause probably lies in overeating and consequent gastro-intestinal disturbance.

The theories suggested offer certainly a possible explanation of the etiology of the two distinct clinical types of arterial disease which we see. The one, a calcareous degeneration of the arteries seen in old people, subject only to the ordinary though perhaps strenuous wear and tear of life, in individuals who do not appear to suffer from the

arterial changes. On the other hand, we have the cases of diffuse arteriosclerosis in younger persons, who suffer most severely from varying secondary pathologic processes, a disease probably toxic in etiology.

The clinical symptoms of arteriosclerosis differ as widely as do the pathologic conditions, and may be divided into symptoms due to localized interference with the circulation, and symptoms due to general obstruction of the whole arterial system as in diffuse arteriosclerosis, with secondary enlargement of the heart.

The symptoms dependent upon arteriosclerosis may then, from a clinical standpoint, be divided into localized symptoms and general symptoms, and I first take up the localized symptoms as these are perhaps less generally recognized than the more severe types of disease dependent upon widespread capillary fibrosis.

Localized Symptoms. The most important, perhaps, are those associated with disease of the vessels of the heart. In many cases of sclerosis of the arch of the aorta we find an extension of the process to the valves of the heart resulting in sclerotic changes of the aortic valves. Such changes are recognized by an irregularity in the aortic second sound often with a slight systolic or diastolic murmur according as the lesion tends to produce a stenosis or a regurgitation through the valves. As these lesions are met with in advanced life, at a time when the heart is not called upon to do as active work as in younger individuals, we often find no serious clinical signs connected with the pathologic changes, and if the sclerosis does not invade the line of closure of the valves the pathologic condition exists merely as an anatomic change, which gives rise to no signs or symtoms during life. Our decision as to the significance of the lesions must be made not on the discovery of a murmur, but on the condition of the heart muscle as to its size and as to its ability to properly carry on the circulation. Such

lesions represent only an extension to the aortic valves of a localized sclerosis of the aorta.

A more important local condition in the heart is found in diseases of the coronary arteries. In this condition we find one of the most important and possibly the only cause of angina pectoris. It is in many cases the true explanation of indigestion and various symptoms of distress in the chest attributed by patients to some fault in the stomach. It is rather unusual in such cases not to find some changes in the radial artery which give strong evidence that our suspicion of disease of the vessels of the heart is correct. The heart is often not enlarged, but the failure of the heart is shown by intermittent action or irregularity, and substernal distress with shortness of breath on moderate exertion. Unless the heart muscle is secondarily diseased we do not find general œdema, pulmonary œdema and allied signs of heart failure.

Our prognosis in these cases must always be guarded.

Thirdly, the heart muscle may be seriously affected by localized disease of the arteries when the circulation is so impeded that the nutrition of the muscle suffers, and we find a gradual dilitation of the cavities dependent upon the weakened condition of the heart wall.

This form of heart trouble represents usually a different type from the enlarged heart due to a widespread capillary fibrosis. I have seen one case of rupture of the heart secondary to a closure of the artery, which had cut off the circulation in the wall of the left ventricle.

Among the most important symptoms of localized arteriosclerosis are the disturbances of the nervous system, central and peripheral.

Central. Vertigo is a common and often a very annoying symptom in elderly people, due to an interference with the circulation in the brain; also tinnitus, for which we find no local cause or any disturbance of the ear. Often these

are the only symptoms that a patient with marked sclerosis complains of.

Epileptiform seizures in old people represent a more extensive involvement: it is important to recognize such a cause for these attacks that we may not make a diagnosis of epilepsy and institute treatment for that disease. The anatomical distribution of the cerebral sclerosis may be in such a situation and lead to so marked a degeneration of the cerebral tissue that a progressive dementia gradually comes on.

Transient monoplegia and transient attacks of aphasia are frequently seen: the question arises whether the symptoms are due to small hæmorrhages or emboli. In many cases the diagnosis is obscure, but the rapidity with which many cases recover seems to preclude the probability of such definite pathologic lesions. Further, frequent post-mortem examinations in cases under my care, in whom during life I had observed several attacks of paralysis of short duration, have failed to show any evidences of a preceding hæmorrhage. But the cerebral vessels were markedly sclerotic. The probability is that such symptoms are due to a spasm of the vessel walls, which temporarily impedes the circulation. The clinical name of vasomotor ataxia is not unsuitable if we bear in mind that it is only a name, and does not prove the exact pathologic condition.

Peripheral. A very interesting class of cases similar in type to the cerebral cases just spoken of represents many forms of "rheumatism," especially muscular rheumatism. An old person with hardened arteries finds that after very moderate walking he has rheumatism in the legs; after a rest or a little rubbing of the part affected the pain passes. In the interval, when the parts are quiet, there is no pain and no local tenderness. Examination shows that the pain is situated in the muscles, and not in the joints.

Such cases are extremely common, and according to the

grade of the arterial lesion, may be developed with or without exercise. The most extreme grade of the disturbance is found in the combination of symptoms so characteristic that they are honored with the name of intermittent claudication; in some cases the loss of function is so marked that there is in addition to the cramp-like pain in the legs actual paralysis. Where the blood supply of the nerves is especially affected we find symptoms of neuritis rather than muscular pain, as in the class of cases just described.

In spasm of the abdominal vessels we may find many cases of obscure disease of the abdomen. Such cases are apparently closely associated with the large class of visceral disease combined with local skin disease of the erythema type.

I have under my care at the present time a lady of advanced years who has arteries that feel like pipe stems. The heart is not enlarged. She has always on any exertion severe dizziness and vertigo. The examination of the eyes shows only a sclerotic condition of the vessels. She is subject at frequent intervals to attacks of severe abdominal pain. She has been under my care for many years. As her digestion is never good and she has not much flesh I have asked several men to see her in consultation, fearing that I might have overlooked some possible malignant trouble. No one has been able to correct my own opinion, that the whole trouble is due to a marked vessel change: this diagnosis has been practically confirmed by the occasional occurrence of small patches of subcutaneous hæmorrhage, which follow what she speaks of as localized rheumatism.

In diffuse arteriosclerosis we find clinical symptoms of a different type from those just described as occurring in localized sclerosis. Pathologically, in this type calcareous degeneration is not common, and the larger vessels, as the aorta, may not show changes in the vessel walls. The process consists essentially in a disease of all the smaller

arteries of the body, shown especially by changes in the media. As I have already said, it is a disease most frequent in persons from forty to fifty years of age, and represents evidently not a process of degeneration, but a growth of the tissue of the vessels.

This is the type that is most suggestive of some toxic process due to infectious disease or some auto-intoxication secondary to over-eating, alcohol, or faulty digestive processes. Clinical observations point strongly to two important causes—excess of food and improper digestion.

The individuals are usually essentially robust and well nourished: pallor is a prominent symptom: the explanation of the pallor is not plain, but the blood examination shows the pallor is not due to a deficiency of hæmoglobin, nor to a reduced number of red corpuscles. The theory has been suggested, and seems probable, that the color of the skin is due to spasm of the smaller vessels.

Two important organs are secondarily diseased—the heart and the kidneys.

In the heart we find the most important factor: in all cases the heart is more or less enlarged, and though there may not be much trouble while hypertrophy is the main factor, in later stages there is a secondary dilatation of the heart cavities. A very large number of cases of "heart disease" are primarily cases of arteriosclerosis with secondary disease of the heart.

Such cases are often first called to our attention by a sense of constriction in the chest, shortness of breath on moderate exertion, and attacks of an asthmatic character. The asthmatic attacks may follow any acute bronchial attack, or be the result simply of overexertion. The blood pressure is always high,—160 or more,—the skin pale, and the pulse rapid, with an occasional intermission.

This is one of the chief causes of myocardial disease of the heart, as distinct from valvular disease. The presence or

absence of murmurs is of no special significance, as the dilatation of the cavities may be so great that a relative insufficiency may be found at any of the valvular orifices.

As the heart gradually fails we find increasing degrees of œdema, until the patient may die of general anasarca. We also find chronic passive congestion of the liver, spleen and kidneys, as in any case of heart disease with broken compensation.

In cases in which the kidney is the chief organ affected we have the picture of the small contracted kidney. It was the association of arteriosclerosis and kidney disease that first led to investigation of arteriosclerosis in the work of Gull and Sutton.

In fact, cases of so-called "cardio-renal" disease, a name in frequent use some years ago, were cases of arterio-sclerosis, in which the heart or the kidney was involved to a great or less degree.

Treatment. In prevention, we cannot, unfortunately, escape all infectious diseases, but we can advise our patients to avoid excess in food, especially when no active exercise is taken, and to care for a proper elimination of excrementitious matter.

When the disease is recognized at an early stage, before the heart is seriously involved, much can be gained for the patient by a careful regulation of the diet. Excess of nitrogenous food, especially meats, should be avoided; further, the weight of the patient should be very carefully reduced by a reduction of the total caloric value of the food taken.

The work should be reduced, both physical and mental; a man with an early arteriosclerosis must learn to live on a lower plane.

One drug I consider of value as a preventive measure and, perhaps in some cases, as a curative measure, iodide of potash. This drug I usually order for three weeks in a month in a dose of 5–10 grains three times a day. When

iodide of potash disagrees with the stomach, iodide of strontium may be substituted though it seems to me less efficacious.

Small doses of nitro-glycerine give temporary relief to many of the symptoms and may do permanent good.

In most cases saline cathartics are indicated.

In recent years there has accumulated considerable evidence that permanent good is accomplished by the use of electricity in the form of the high frequency current.

DISCUSSION.

Dr. George G. Sears, of Boston: One of the most interesting clinical aspects of arteriosclerosis, but of which Dr. Jackson has not spoken in his able paper, is the increased frequency of its occurrence, about which all observers seem to agree. We are accustomed to speak with satisfaction of the greater expectation of life now compared with a hundred or even fifty years ago, but our satisfaction should be considerably chastened by the fact that this prolongation has occurred in the years of adolescence and the statistics of the life actuaries of to-day appear to show that a man of forty-five stands rather a less show of arriving at the age of 65 than he used to, and one of the great causes of this is arteriosclerosis. The causes of arteriosclerosis, so far as we know them, are so bound up with the social, moral and physical life of the individual that it seems impossible that we should do much in prevention, since few persons are willing to listen to advice so long as they feel perfectly well. Our chief hope would seem to lie in recognizing it sufficiently early to be able to arrest or at least to delay the disease. Special interest should therefore be taken in those clinical aspects which are manifested in its incipient stage. Diagnosis is comparatively easy after it has progressed for a certain length of time. While it is a general disease it tends to progress with greater rapidity in one or another region, so that the picture will vary according to the organ which bears the brunt of the attack. The symptoms pre-

sented are those due to failure or perversion of function of the affected organ, added to which in many cases are symptoms due to spasm of the vessels at fault which lead to such manifestations as angina pectoris, angina cruris, or intermittent amaurosis, in the latter of which one may even see the spasm of the vessel. Early diagnosis, however, is a different matter, since the changes from normal are at first slight and often misinterpreted. Yet there are certain suggestive symptoms which are quite characteristic, particularly as we look back over the histories of those patients whom we have been able to follow from the beginning of the process. The most marked, and perhaps the most frequent, is the apparently causeless, but progressive loss of health which may be shown by lack of vigor, low spirits, inability to sleep as well as formerly, disturbing noises in the head, and sick headache; symptoms which we are accustomed to associate with neurasthenia, if one may still be permitted to use that term. Neurasthenia coming after forty should be looked upon with considerable suspicion. Neurasthenia it may be, but back of it circulatory disturbances should be looked for which may have contributed to, if they have not been the cause of the condition. The same suspicion should be attached to certain cardiac disturbances which are not infrequent in the early stages, some intermittency or irregularity of action, possibly a feeling of discomfort about the heart, or even pain, not enough to complain much of but sufficient to call the patient's attention to the fact that he has a heart. These are symptoms which are associated with such toxic substances as tobacco, alcohol or coffee, and such a cardiac condition may be dependent on them alone, but it should be remembered such symptoms are more easily produced when the arteries are beginning already to degenerate. There are also certain urinary changes which are suggestive and which I suspect are due, in part at least, to the spasm of the vessels in the kidneys, analagous to that in the heart which produces the symptoms of angina. The amount of urine which is passed and the specific gravity of the individual specimen may vary greatly as a result. These changes may be noticeable from day to day, or even from hour to hour; possibly one may find occasionally a slight trace of albumen, perhaps also a few casts. Careful and prolonged study of the urine may be of decided help in reaching a diagnosis.

On physical examination one finds if the blood pressure is raised, some accentuation of the second sound of the heart over the base. The accentuation is usually more marked on the aortic side, but the sound in the pulmonic area may be the louder, a fact which does not seem to be generally recognized. The first sound of the heart as hypertrophy progresses is prolonged and heavier, but hypertrophy itself, which may or may not occur in arteriosclerosis, is often difficult to make out and is on physical examination frequently overlooked. Efficient assistance in recognizing the initial stages of arteriosclerosis, when much can be accomplished by treatment, is furnished by the various instruments for estimating blood pressure, and their use as a supplement to the trained finger should never be omitted when the patients have reached middle life. Persistent high pressure is a potent cause of arteriosclerosis, but arteriosclerosis is not necessarily associated with high pressure. Clifford Allbutt's classification of the disease seems to me the best one from a clinical standpoint, but it does not seem necessary to except from this classification, as he does, some of its rarer forms. He divides it into three classes. First, involutionary, which is often hereditary, and whatever it may be due to it is not a result of high living. It is not necessarily associated with high pressure, indeed it often is not, and for that reason, Dr. Jackson says, apoplexy is comparatively rare in these cases, even when the arteries are greatly degenerated and calcareous. Such cases are more apt to die from gradual failure, unless cut off by intercurrent diseases. The second class is of mechanical origin and a result of continued high pressure. These are the cases in which the sphygmomanometer is most useful by giving timely warning. The third class is toxic or infectious. It occurs especially in comparative youth and may or may not be associated with a rise of blood pressure. Fortunately for our patients we are gradually approaching knowledge that high pressure is a symptom and compensatory. In the circumstances under which he is living it is necessary for the life and comfort of the individual and no more to be treated than a cardiac murmur. It is fortunate also that drugs are powerless to reduce it, and the well-meant but misdirected efforts of the physician to reduce it are successfully resisted by nature, which in her efforts to preserve the

life of the patient fails to honor his drafts. It should also be emphasized that high pressure and a strong myocardium are not necessarily associated, since a weak heart may be accompanied by a high tension pulse. This accounts for the beneficial action of digitalis in some cases, even when the tension is very high. The patient may require a pressure of 200 or more in order to live, and to overcome this resistance in front the heart requires the tonic effect of digitalis.

Dr. Richard Hogner, of Boston: Dr. Jackson is perfectly right in saying that we all have to expect arteriosclerosis sooner or later. It is not due to old age, however, but because we are using alcohol, tobacco, coffee, tea; are over-eating too often; also often over worried. Arteriosclerosis is a rare condition in animals, no matter how old.

The natives in the islands of Samoa and Fiji, living in the interior of the island, mostly on fruits and water (using no stimulants whatever), and a healthy, natural life, are strong, intelligent, tall, often over six feet, and at the age of 60 are almost as vigorous as one of our boys at 20.

The same race, living at the coast, under the ban of so-called civilization, drinking alcoholics and using tobacco, are weak, dull, small, degenerates, and at the age of 30 are almost as weak as one of our race at 60 or more.

In California are living many Indian women at the age of 100 to 130 years. One at the age of 120 carried on her back a bag, containing six big watermelons, for three miles.

A common symptom of arteriosclerosis is redness of the face, a symptom the most elderly persons show, often very markedly.

To repeat, I do not think that arteriosclerosis is caused by old age, but that the symptoms of wrong living do not show up before we are old.

Dr. William H. Robey, Jr., of Boston: There is one form of arteriosclerosis which has particularly interested us at the Boston City Hospital. I refer to the cases in which there is marked widening of the aorta to percussion, with pain and pulsation in this area. The differential diagnosis between arteriosclerosis and aneurism is not always easy in these patients. One patient was a man weighing 220

pounds with a thick chest making percussion unsatisfactory. He had paroxysms of pain under the sternum radiating to the left arm. He had an increased area of dullness, and the X-ray expert thought that he had an aneurism. Dr. F. C. Shattuck saw this patient in consultation, and considered the condition one of arteriosclerosis. Subsequent treatment proved this to be the correct view.

A second case has presented more difficulties. A stout woman of 55 has had substernal pain and pulsation for two years. Her blood pressure is 230. On sinking the finger into the suprasternal notch a distinct pulsation is felt synchronous with systole. Several members of the staff who have seen her with me have agreed that there was strong evidence of aneurism, but two X-ray examinations nearly a year apart have been against this condition. Under treatment for arteriosclerosis she has slowly improved.

ARTICLE XLI.

MEDICAL INSPECTION IN PUBLIC SCHOOLS.

By JUSTUS G. HANSON, M.D.
OF NORTHAMPTON.

READ JUNE 7, 1910.

MEDICAL INSPECTION IN PUBLIC SCHOOLS.

Compulsory medical inspection in public schools in the United States was first enacted as a law in Massachusetts in 1906. Probably no health legislation of recent years has been so important, for it opens the way to a very general dissemination of knowledge as to conditions pertaining to health and disease, and can be made a tremendous factor along the lines of preventive medicine.

The law as it exists gives the school inspector control over all health matters pertaining to pupils, teachers, janitors and the sanitary conditions of school buildings. The law does not provide for any penalty to parents who neglect the health of their children. This must be a matter of education, but a penalty can be imposed under the Compulsory Education Act for absence from school by reason of defects that are within the power of the parent to correct, and under this act courts have imposed a fine for failure to keep the child free from pediculi and its ova, and for not treating impetigo contagiosa.

Dual powers have been granted certain School and Health Boards in the appointment of school physicians, but while these boards should coöperate, it would seem best that appointments be made by the School Boards; for the reason that it is so essentially an institution within the school, and also because School Boards are more stable and the office is not as liable to become a political football.

Short experience in the work led physicians to advocate a school nurse, one who could follow up the cases, go to the homes and interest the parents in the health of their chil-

dren and get them to consult their family physicians. The doing of this naturally brought the nurse in contact with cases of destitution and has led to an alliance of this work with Civic Leagues, children's societies and charitable institutions. I believe a nurse to be of invaluable aid to the school inspector and a most important factor in the scheme of school inspection.

As there is no provision for general supervision in the application of this work, we find throughout the state all sorts of school inspection, some medium, some fair, some worthless. In a few cities and towns regular visits, complete records and detailed reports are made. This last method is the only proper way of expending public funds, and the work, if made uniform throughout the state, would open up a store of knowledge as to the general health of children, the manner of handling epidemics, conditions in school houses, the care and distribution of books, pencils and paper, the effects of dust, heat and moisture, and the care of defectives.

To successfully accomplish this, there should be established a department of Hygiene, having nominal control over school inspection and perhaps over the thirteen health inspectors who are carrying on a similar work in shops and factories. Then by furnishing the inspectors with uniform blanks, and calling for certain facts, fairly even work would be obtained throughout the state, and slipshod methods would be eliminated.

In this work the teacher has the best opportunity of watching the child, and to her we must appeal for the best results of inspection. It would be well if normal schools would give teachers instruction in Hygiene, and to so much of children's diseases and defects as they are likely to meet in their work. Every inspector should get his teachers together two or three times each year and instruct them in such conditions as may come to them, and during the year keep in touch by bulletins relative to individual schools.

The teacher being nearer to parents, should have occasional parents' meetings, and to them give advice as to proper food, clothing, sleeping quarters, personal care, etc. In one of our schools, attended largely by children of foreign parents, the teachers have had the children interpret this advice to parents, and much interest has been awakened, and the results have been cleaner children, more open windows in sleeping rooms, more baths, suitable food, more sunlight and more tidy homes.

It has been our endeavor to keep our schools open during epidemics and to prevent or check epidemics, because every closed school means a money loss to the city. A very interesting fact was developed relative to measles, showing the contagiousness of the disease even before the child is known to be ill. In a room of thirty-five children about seven years of age, a child was in school Friday apparently well. On Monday the child was ailing and kept at home. On Wednesday, a diagnosis of measles was made. On Thursday, eighteen children in that room who never had the disease were excluded for two weeks and a note sent the parents that they had probably been exposed to measles. Within the two weeks sixteen of the eighteen were reported as ill with the disease. By getting these cases out early we were able to keep the school open and not another case developed in the building. By following this method we have been able to keep the schools open and check epidemics.

Examinations of our children have brought out four important facts:

First: The great number of children with defective teeth, or a better description might be with septic mouths. It is a remarkable fact that these children are found to have inflammatory diseases of the pharynx and nasal cavaties, and are often anemic. It surely must be ignorance which permits a parent to allow a child to lose its first molars as fast as they come and have them go through the most active de-

velopment period of life without the teeth so essential to proper mastication.

Second: The large percentage of children with defective sight, 10% having only $\frac{15}{20}$ vision or less. By law parents are notified, and it is by experience that a large proportion of these are attended by itinerant oculists and low grade opticians. Is it logical for a State to insist upon yearly examination and reports and then permit unskilled persons to treat such cases?

The medical profession should stand as a unit in demanding that no person should prescribe lenses or treat the eye who has not had a thorough medical training not only in eye defects but in such other conditions of the human body as produce disturbances of vision.

Third: The great number with enlarged tonsils and adenoids. Most parents readily heed the advice of the family physician and have them removed.

Fourth: The number found anemic. These children are usually found in our schools among the foreign born and the more illiterate. Conditions prevailing to cause anemia and tuberculosis, lack of proper food, obstructions in the vault of the pharynx, small tenements and insufficient air and sunlight. Physicians have been impressed with the necessity of aiding these children, and experimentally open air schools have been established with most gratifying results. It is not an expensive thing to try, for all that is necessary is to construct a platform 35′ x 35′, on the southern exposure of a school building and put an awning over it with flies on the three sides that can be used if the sun is too bright. On rainy or very cold days the children can occupy the adjoining school room. Except for a few weeks in winter, this out-door room can be used for anemic children with most gratifying results, being followed by a marked increase in the children's weight and in the percentage of hæmoglobin in their blood.

This leads me to discuss a special school that should be established in every city, a school for defectives. There are from forty to fifty such to every 2500 school children, and in our public schools they are a nuisance, and a hindrance to the normal children who are thrown into contact with them, besides interfering with the work of the teacher and getting themselves no benefit from attendance. Segregating these children and placing a trained instructor over them, they can be taught considerable that will not only render their care more easy to parents and guardians, but will help these unfortunates to lead a more useful life.

School work demands the coöperation of the medical profession! Its aim is to establish a closer relation between physicians and their families, to educate the public in matters pertaining to health and comfort, to check epidemics, to educate in relation to tuberculosis, and matters of home hygiene.

If careful systematic inspection is carried on throughout the State, succeeding generations because of it will be burdened by less physical and mental cripples, will be more free from contagious and infectious diseases, and will have a more intelligent conception of disease, and its cause and effect.

DISCUSSION.

Dr. Thomas F. Harrington, of Boston: The most important factor to-day in discussing medical inspection of schools is the recognition of the great responsibility that the state, especially the state of Massachusetts, has placed upon the medical profession in the newer and wider conception of this branch of preventive medicine. In its law of compulsory medical examination of all public school children, as well as in its child labor law of 1910, this state gives to the detection of contagious diseases secondary consideration only, and points out clearly that such duties are

by no means the principal functions of school physicians. This view is in accordance with the established facts of modern bacteriology, and is founded upon the experience taught by the past fifteen years of school inspection.

Besides the immunity afforded by compulsory vaccination, more than eighty per cent. of children entering school for the first time have had measles, and more than forty-five per cent. have had scarlet fever. Tuberculosis in its transmissible form is exceedingly rare among the children; and few, if any, of the one per cent. "carriers" of the Klebs-Loeffler bacillus have the virulent form of the microbe present. Special hospitals for the care of contagious diseases, the free bacteriologic examinations of sore throats by cities and towns, and the free supply of antitoxin and vaccine sera by the state, have combined to remove more than sixty per cent. of these cases from homes and schools before they had become a menace to others. The supposed influence of school closure as a factor in the decreased morbidity of contagious diseases during the vacation period is now recognized as a coincidence in the seasonal fluctuation of those diseases, insomuch as the decrease in the number of cases begins two weeks before the closing of school in June, and the increase begins two or three weeks before the opening of the schools in September. This is especially significant on account of the well-recognized short period of incubation in these diseases of childhood. The extreme contagiousness of measles before the appearance of the rash, and the evidence to-day that the desquamation in scarlet fever is not the chief source of contagion in that disease, are both factors in preventive medicine, emphasizing the need of greater knowledge of contagion in the homes rather than an argument in favor of the daily inspection of schools by physicians. The rarity of school outbreaks, independent of general or neighborhood outbreaks of transmissible disease, is likewise significant.

While the congregation of children in large numbers daily should not be underestimated as a possible means of spreading contagion, nevertheless we are not warranted in charging them with being "foci" of contagion greater than other gatherings, public and private. Schools, on the contrary, offer the best common medium for the control of these diseases. Teachers and school nurses learn frequently

from the children of the existence of contagion in the homes, which otherwise would go unreported. This is especially true concerning measles and whooping cough, diseases lightly considered, in fact invited, by the laity on account of the supposed freedom from danger and the immunity afforded by an attack. The truth is that these two diseases are each more fatal than either scarlet fever or typhoid fever, and each lays a foundation for tuberculosis not equalled by any other one cause. If the medical history of each child entering school for the first time could be made a part of his registration, much useless exclusion from school could be avoided and unnecessary exposure to prevailing neighborhood contagion averted. School principals are very ready to coöperate with medical authorities in all measures tending to maintain a high attendance of healthy children. Already they have taken the initiative in reducing to a minimum the possibilities of spreading infection by means of "contact" among the pupils while in school. The lessons in prevention will take time for their dissemination into the homes and among the public. In the meantime, school nurses are doing most valuable work in educating the homes, and the results in combating the spread of infectious diseases, thus far accomplished, promise much more than those guaranteed by the daily inspection of schools by physicians.

The eradication of the skin diseases and the parasitic affections communicable among children do not call for daily attendance of the physician. These are chronic affections usually and are remedied by close continued treatment only. This no medical inspector recognizes as his function; nevertheless, few parents ever seek private or public medical aid for these children. They are diseases calling for isolation, if not exclusion. To exclude these children without some "follow up" system for treatment aggravates the situation and manufactures truants, if not vagrants, in many cases often. School nurses under medical supervision have been able to solve this problem in many localities, and the absenteeism of the infected pupils has been reduced to a minimum; protection to the other children in the home and in the school being assured.

When we pass from the consideration of the infectious and the parasitic diseases into the wider domain of preven-

tive medicine, we find abundant opportunities for the best thought and the highest services of the physician. A new field in medicine awaits him. Educational authorities and grade teachers recognize the shortcomings of the present system of medical inspection in aiding them in adjusting school life and physical growth so that each child shall receive his full complement of both. Many conscientious medical inspectors have done much to meet the requirements of the situation. Where medical inspectors have been Health Department physicians of the contagious disease division, their work in the schools has necessarily been incidental and, to a great degree, associated with the work of that division. Such a system fails to cover the larger part of the actual conditions in the schools needing medical attention. The Health Department and the School Department should bear co-equally the solving of the problem awaiting solution. There need be no duplication of efforts, there should be no friction. Neither should the surgical aspects of some of the problems met in the inspection of large groups of children be so prominently emphasized. Statistics based upon the investigations carried out in the Boston schools could be quoted to prove that much of the sensational announcements relative to the importance of these factors in causing mental and physical retardation are unwarranted. A summary of the problems met in the schools shows this. These problems are varied; and, although pedagogical in aim, nevertheless they are strictly medical in solving.

In the first place comes the detection, in the earliest years of school life, of those defects tending to prevent the child receiving the fullest benefits of his school work. Under this heading we find defects in speech, in vision, or in hearing, bad postures, lack of nervous stamina, incoördination, epilepsy, chorea, carious teeth, anæmia, glandular enlargement (including tonsils and adenoids), improper feeding, insufficient sleep, overwork, etc. Then, too, the amount, the kind, and the time of the daily gymnastic exercises, of organized games, plays, recreations, and dances,—all means of mental as well as physical development when properly guided and controlled along physiologic, as well as psychologic, lines. The control of athletics so as to give to each pupil an opportunity to develop a healthy physique with-

out the danger of surpassing the age, sex, or individual limitations of each one is greatly needed,—a problem which can be solved rationally by medical guidance only. The physician is likewise an essential factor in dealing rightly with the retarded pupil, with the mentally backward or defective, as well as in guiding the over-bright; also in fitting school programmes, so that the growth, development, fatigue, and rest shall each be harmonized; and in the kind and quality of school lunches, etc. Nor are the problems any less pressing in the sanitation domain. Here the medical advice of the specially trained physician is needed in the choice of school sites, in the planning and the arrangement of the buildings and grounds, as well as in pointing out the imperfections in those at present occupied and in the improvements necessary to render them sanitary. This includes also the establishment of open-air classes and the enforcement of rules concerning ventilation, heating, room temperature, lighting, seating, cleaning, as well as the supply of bathing and hygienic drinking facilities,—all problems of health greatly neglected to-day. Finally the great problem of interpreting rightly the advances made in hygiene and in physiology, especially in physiologic chemistry, so that those truths may be presented to the teachers and Normal School pupils in such a way as to enable them to instil into the minds of the children an interest, as well as a useful knowledge of the laws of health. Hygiene and physiology as taught to-day in the schools are very far from fulfilling such needs,—a shortcoming recognized by most grade teachers and special teachers.

The problems and the opportunities awaiting the physician in school life to-day could be enumerated without limitations, embracing many of the most interesting branches of medical, psychological, and pedagogical aspects of child life. They are not diseases controllable by Board of Health laws. The aim and the purpose underlying all medical supervision in the schools are primarily that all grave hindrances to the school life of the child and to his doing successful school work shall be prevented and removed. This makes the physician's position in the school organization educational as well as medical; consequently the authority to whom the control and purpose of school work is especially entrusted should determine in a measure the duties

and the qualifications of its medical officers; and this department, to which all the investigations and reports pertain directly, should control the services of those making such reports.

Medical inspection, medical supervision, school hygiene, or any other system for combining medicine and pedagogy, calls for an organization on the widest plan of preventive medicine. The public will hold the medical profession responsible for the type of the work done as well as for the immediate results. The work calls for a special line of instruction in medicine not yet offered in many medical colleges. The medical profession, however, cannot avoid the obligation nor neglect the responsibility. Modern medicine has made this an evident duty of the physician. State medical societies, such as this one, should act at once through its special committees by formulating a plan, by establishing the qualifications of fitness, as well as by fixing the rate of compensation of those who are to undertake this branch of medicine. This is essential for the guidance of the state and city officials, in order that this important branch of preventive medicine may be uniform and effective according to the particular needs of each city and town, and the whole scheme in perfect accord with the highest ideals in medicine as well as in education. With a School Medical Department established upon some such basis, the school physician would readily become the counsellor and guide whom school authorities are seeking, in order to give to school life that higher efficiency and greater health which the recent advances in medicine and in pedagogy have made possible.

ARTICLE XLII.

ON THE IMPORTANCE OF DETERMINING THE POTENCY OF DIGITALIS PREPARATIONS.

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ON THE IMPORTANCE OF DETERMINING THE POTENCY OF DIGITALIS PREPARATIONS.

No one can have read the case-reports in William Withering's "Account of the Foxglove and some of its Medical Uses*" without being struck with the remarkable efficacy of digitalis in his hands. It was Withering who discovered the diuretic properties of digitalis, and introduced its use in the treatment of heart disease. His classical monograph is to-day, as it has been for over one hundred years, the best guide to the employment of digitalis. One hundred and sixty-three cases are described in which the drug was given under Withering's direction, and there are in addition notes on many cases communicated from correspondents. The entire work is a model of keen observation and sound reasoning, and one free from "any unjust predilection in favor of the medicine."

Digitalis, as Osler† says, is one of the dozen drugs the uses of which repay a life-long study. There is truth in the German aphorism quoted by His‡ that the experienced physician can be distinguished from the inexperienced one by the way in which he uses digitalis.

The vital importance of having active preparations of this life-saving drug does not need to be emphasized. Inert digitalis can be compared to a life preserver that will not float. The tragedies caused by the one in disasters at sea have been duplicated by the other in many a household.

Little attention has been paid by our physicians and

* Withering's Tracts and Memoirs, London, 1822, vol. ii, p. 103.
† Osler. Modern Medicine, Philadelphia, 1908, vol. v, p. 267.
‡ His. Die Therapie der Gegenwart, 1908, October, p. 433.

pharmacists to the preservation of digitalis leaves, although excellent studies on the physiological standardization of digitalis and strophanthus preparations have been made in this country. (Houghton,* Famulener and Lyons,† Edmunds,‡ Hatcher,§ Edmunds and Hale,‖ and Hale,¶ **.) The statement is made in the last edition of the National Dispensatory (1909)†† that there appears to be no foundation for the idea that the leaves deteriorate rapidly and are nearly or quite worthless after a year from the time of their collection.

Focke‡‡ has proved by biological tests that the presence of moisture in the leaves causes a rapid loss of the active principles. This is probably due to the action of ferments. Leaves which when dried contain 8% of moisture lost three-fourths of their strength at the end of one year. On the other hand leaves that were dried until they contained only 1.5% of moisture and then placed in air tight bottles lost practically none of their potency in a year. Focke asserts that improper drying of the leaf accounts for differences in strength amounting to 500% or more. Ziegenbein§§ has proved by physiological and chemical methods that the strength of the digitalis varies greatly with the locality in which it is grown. When the clinicians, Kussmaul, Naunyn, and Krehl came to Strassburg as professors in the university, they each in turn discovered that the Alsacian digitalis was much stronger than that to which they had been accustomed and that it was necessary to use smaller doses in or-

* Houghton, J. Am. M. Assoc., 1898, xxxi, p. 959.

† Famulener and Lyons, Proc. Am. Pharm. Assoc., Phila., 1902, L., p. 415.

‡ Edmunds, J. Am. M. Assoc., 1907, xlviii, p. 1744.

§ Hatcher, J. Am. M. Assoc., 1907, xlviii, p. 1177.

‖ Edmunds and Hale, Hygienic Laboratory,—Bulletin No. 48, Washington, 1909.

¶ Hale, J. Am. M. Assoc., 1910, liv, p. 35.

** Hale, J. Am. M. Assoc., 1910, liv, p. 129.

†† National Standard Dispensatory, Second Edition, Phila., 1910, p. 551.

‡‡ Focke. Die Therapie der Gegenwart, 1904, xlv. p. 250.

§§ Ziegenbein, Arch. der Pharm., 1902, ccxl, p. 454.

der to avoid marked toxic effects. Variation in the potency of digitalis obtained from apothecaries is due chiefly as Focke says, to deterioration from age and moisture and not to the habitat of the plant. Focke* in 1904 gave definite rules for the preparation and preservation of digitalis. The leaves should be dried as soon as gathered at a temperature below 100° centigrade. After being well dried so that their water content is less than 1.5% they should be rubbed down to a powder while still exposed to a moderate heat. By the mixture of strong with weaker digitalis it is possible to obtain one of a standard strength as determined by the biological tests. The powdered leaf should be placed in narrow mouthed bottles containing not over 50 grams. Focke's method has been adopted by two firms, G. Schallmeyer of Marburg, and Cæsar and Loretz of Halle.

Recent scientific tests have shown that the drug is best preserved and administered in the form of powder. It is interesting to note that this was known to Withering. He gave the following definite directions for the preparation of the powder which differ in no essential from those of Focke. "The leaf-stalk and mid-rib of the leaves should be rejected, and the remaining part should be dried, either in the sunshine, or on a tin pan or pewter dish before a fire. If well dried they readily rub down to a beautiful green powder, which weighs something less than one-fifth of the original weight of the leaves. Care must be taken that the leaves be not scorched in drying, and they should not be dried more than is requisite to allow of their being readily reduced to powder." These directions have been disregarded and forgotten. In 1905 I could not find that any digitalis was imported into this country in the form of powder.

Allen's English leaves have been held in high favor for many years, and are largely used at the present time in Boston. They are sold in large tins, each containing a pound

* Focke, Loc. cit.

of leaves, including the leaf-stalk and mid-rib. The mouth of the can is a large opening, 3¼ inches in diameter, closed by a low tin cap. This original package is one that makes the proper preservation of the digitalis difficult and I know from personal observation that the cans are sometimes left open, exposing the leaves to the moisture of the air. A pound of digitalis often lasts the larger retail druggists from two to three years.

Prior to 1905 I used a number of different stocks of digitalis obtained from local pharmacists, but found none that yielded satisfactory results in the ordinary doses. I now know that this can be explained by the age of much of the leaf and by the fact that it was often insufficiently protected from the moisture of the air. I have seen digitalis offered for sale that had been in stock three years. Sometimes the leaf is already old when it reaches the city. A can of English digitalis with a potency certificate, date July, 1908, was not received by a Boston pharmacist until nearly 18 months later. Improper drying of the digitalis may lead to rapid deterioration as Focke has shown.

I became convinced that the digitalis leaves, available in Boston, were of poor quality, so in 1905, Frank O. Guild, the pharmacist, at my request imported from Germany some of Merck's powdered digitalis. This new powdered leaf exerted promptly the characteristic action,—slowing of the pulse and diuresis. I have repeatedly seen it act beneficially when other digitalis has failed.

The value of the German leaf was strikingly shown in the first case in which I used it.

The patient was a middle aged woman with chronic myocarditis. She had been under my observation since July, 1904, and was frequently seen by my colleagues at the Massachusetts General Hospital. Anasarca, dyspnœa, recurring cough, and scanty micturition were the chief symptoms. I had given her digitalis obtained from various local sources

with no definite results. The following extract from my case-report shows strikingly the failure of the old digitalis to produce diuresis. Note made April 4th, 1905—"Four days ago she was unable to void any urine. She states that for two weeks the quantity of urine has been scanty. Five days ago she consulted Dr. X. who gave the tincture of digitalis in 10 drop doses thrice daily. Yesterday he increased the amount to twelve drops. For the past three days the daily amount of urine voided has not exceeded half a pint." On the morning of April 6th she began to take 5 grains of theocin three times a day. During the following twenty-four hours she passed nearly four liters of urine.

Symptoms recurred from time to time. Digitalis failed to lower the pulse rate, or in fact to show any action. Early in June she was troubled with cough and dyspnœa. Numerous medium sized moist râles were heard over the lungs and she raised considerable viscid frothy sputum. Her pulse was usually about 120 to the minute, weak, irregular and at times imperceptible. On July 24th the pulse rate was 124 and so feeble that it could not be counted at the wrist. Note made September 20th.—"She has had severe cough for a week. Unable to sleep well for a month owing to nervousness; considerable dyspnœa. She passes the normal amount of urine. Cough the chief symptom. *Status præsens:* Slight cyanosis of the lips; respiration a trifle labored and quickened, 32 to the minute. Cardiac impulse cannot be seen or felt. Only slight enlargement of the heart; no dullness to right of sternum; absolute cardiac dulness does not extend to the left beyond the parasternal line. Systolic bruit replaces the first sound at the apex. Both sounds heard at the base. Cardiac action irregular. Pulse at the wrist so weak that it cannot be counted. Many fine, moist râles heard over both lungs, especially at the bases behind. The patient raised during the night about 150 cc. of frothy serous sputum."

The first of December, 1905, she was given the powdered digitalis from Merck which had just been received from Germany. On December 8th, 1905, I noted that "the new digitalis has helped her greatly. The cough is much less, the pulse is slow but irregular and varies from 16 to 20 to the quarter. The rate at the cardiac apex is the same as at the wrist. To-day is the first time in six months that I have found the pulse below 120. The cardiac dulness is greater than it has been. She has taken about 2.5 grams of the digitalis which I discontinued to-day." When I saw her on the 25th of January, 1906, she had been taking the powdered digitalis for five days. Her pulse was slow, 76 to the minute, and of good quality. During the following five months she was in excellent condition. She did not come under observation again until July 1906, when I noted that the patient was looking well, and much younger than I had ever seen her. The pulse was not accelerated, but was somewhat irregular in rhythm, and she was beginning to suffer again from dyspnœa and cough. Although she has had since then frequent attacks of cardiac insufficiency, she has always been benefited by the German powdered leaf and is still able to do light housework. (June 1910.)

The strength of Merck's powdered leaf and the weakness of a tincture, employed in the usual dose, was shown in the following case:

On December 10th, 1909, I saw in consultation, Mr. M., aged 62, who was suffering from cardiac insufficiency the result of coronary sclerosis. When first seen by his physician on Oct. 21st, 1909, his pulse was rapid and irregular. There was swelling of the feet and œdema of the lungs. Shortness of breath was the chief complaint. Rest was followed by marked improvement and at the time of my first examination there was no œdema and he could walk without dyspnœa. Although he had taken 15 drops of a tincture of digitalis three times a day for six weeks the pulse

remained rapid. In my note I stated that the rate over the precordium was about 130 and of very irregular rhythm. Some of the beats failed to reach the wrist. The radial pulse was small; the blood tension 195. A tracing showed the arrhythmia to be of the absolutely irregular type. The heart was dilated to the left. No murmurs were heard. After the digitalis was discontinued for about ten days the patient was given a prescription for two grams of Merck's powdered leaf divided into pills, each containing 0.1 gram. Without consulting his doctor he had this refilled. After he had taken three or four of the additional doses, purging, nausea, and vomiting developed, but disappeared promptly when the digitalis was stopped. The pulse did not become rapid again as long as he remained under observation (one month). In this case the tincture (45 drops a day) showed no definite physiological action in six weeks, while the leaf (0.3 gram daily) produced marked toxic symptoms in eight days.

A patient in my clinic at the Massachusetts General Hospital who suffered with chronic passive congestion of the lungs attended by cough and the spitting of blood obtained no relief from a digitalis tincture in the ordinary dose. A few days after the administration of the active powdered leaf the cough and bloody expectoration ceased.

Some physicians have told me that they never see any benefit result from the digitalis they prescribe, and I know of instances in which the tincture has been given in large doses for a long time without toxic manifestations supervening. Dr. George C. Smith has related to me the case of a patient seen by him in consultation who had taken 30 drops of a digitalis tincture three times a day for six weeks without any apparent result.

Attention should be called to the fact that the tincture is generally given in too small doses to produce a prompt physiological effect. A tenth of a gram of digitalis is the

usual dose of the powder. This corresponds to 1 cc. (15 minims) of the tincture, but a cubic centimeter will be found to contain 35 to 40 drops of the tincture when the ordinary medicine dropper is used. Hirschfelder* in his recent work on diseases of the heart recommends large initial doses of digitalis. If Withering's directions for the administration of digitalis were followed the use of an inert drug would really be detected. "Let the medicine," he said, "be continued until it either acts on the kidneys, the stomach, the pulse, or the bowels; let it be stopped upon the first appearance of any one of these effects.

Fraenkel† showed that six infusions obtained in Heidelberg and vicinity varied in toxic dose from 100 to 275 per cent; six tinctures from 100 to 400 per cent. Edmunds‡ in Ann Arbor, examined seventeen tinctures of digitalis and found great variation in strength. Two "standardized" preparations from one manufacturer were examined and one was found to be twice as toxic as the other. Edmunds and Hale in their admirable monograph present a complete resumé of the literature dealing with the standardization of digitalis.

BIOLOGICAL TESTS OF DIGITALIS.

It is generally admitted that the value of digitalis preparations can be more accurately determined by biological rather than by chemical tests. The amount of digitalis required to stop the heart of a frog in systole is the most accurate indicator of its strength and is the basic principle of of various frog-heart methods.

Twelve hour method. This was introduced by Houghton§ 1898 for the physiological assay of strophanthus.

Twenty-four hour method. Bührer‖ ascertained the

* Hirschfelder. Diseases of the Heart and Aorta. Phila. 1910, p. 179.
† Fraenkel. Ther. der Gegenwart, 1902, p. 166.
‡ Edmunds. Journ. Am. Med. Assoc., 1907, xlviii, p. 1744.
§ Houghton, Loc. cit.
‖ Bührer, Inaug. Dissert, Basel, 1900.

smallest amount of the drug that produced systolic standstill of the heart within twenty-four hours.

One hour method. This was first employed by Albert Fraenkel,* working in Gottlieb's laboratory, in 1902. It is recommended by Edmunds and Hale† who conclude from their study that it is superior to the perfusion method or to that of Focke.

Perfusion method. Using Williams' apparatus Santesson‡ determined the lethal dose by adding digitalis to the fluid used in perfusing the isolated heart. Edmunds and Hale† measured the time required to stop the isolated heart with digitalis contained in Ringer's solution.

Focke's Method. Focke§ ascertained the amount of a 10% infusion that would cause the heart to stop in systole in a frog of about 30g. weight (*Rana temporaria*) within the time limit of seven to twenty-five minutes. The operating room was kept as nearly as possible at a constant temperature, whether the tests were made in summer or winter. Focke expresses the potency of the drug by the following formula: $V=\frac{p}{d \times t}$. The toxic value (V) is determined by dividing the weight of the frog (p) by the quantity (d) of the drug,—10% infusion—multiplied by the time for systolic standstill of the heart to occur. For example, $V=\frac{30}{0.6 \times 10}=5$. According to Focke good digitalis leaves give a value of 5 (V=5).

Thirty minute method. Gottlieb‖ and Fraenkel¶ now recommend the thirty minute method, although in his early work Fraenkel used the time limit of one hour. They de-

* Fraenkel, Loc. cit.

† Edmunds and Hale. Loc. cit.

‡ Santesson, Skandi. Archiv f. Physiol., 1905, xvii p. 389. Cited by Edmunds and Hale.

§ Focke. Arch. d. Pharm, 1903, ccxli, pp. 128, 669. Ther. der Gegenwart, 1904, p. 250. Berlin. klin. Wochnscht., 1906, xliii. p. 642. Arch. d. Pharm. 1907, ccxlv, p. 646.

‖ Gottlieb, Muench. med. Woch., 1908, lv. p. 1265.

¶ Fraenkel, Ergebnisse der inneren Medizin und Kinderheilkunde, Berlin, 1908, 1, p. 88.

termined the amount of digitalis necessary to produce systolic standstill of the heart in exactly thirty minutes. They introduced the "frog unit" which is analagous to the antitoxin unit. Their frog unit is the amount of digitalis required to stop the heart in systole of a frog weighing 30 grams in thirty minutes. Fraenkel states that a gram of good digitalis should contain 50 frog units.

Experimental Study.

The thirty minute method was used and an effort made to select frogs weighing 30 grams, but owing to the limited supply it was necessary to use lighter and heavier ones as well. The frogs were weighed to within the limits of one gram and the dose of digitalis per gram of body weight was calculated. With the aid of Professor Cannon, the experiments were made in the physiological laboratory of the Harvard Medical School, during the months of December and January. The frogs were brought to the operating room from the cold tank a few hours previous to the tests and kept in a glass receptacle containing a little water. The temperature of the room was usually 20° C. and never varied more than one degree. A freshly prepared 10% digitalis infusion was injected into the ventral lymph sac. The frogs were then placed under bell jars containing pads of well moistened filter paper. At the end of 30 minutes the animals were pithed, fastened to frog boards, and the heart exposed in the usual manner. When the drug had exerted its characteristic toxic action the ventricle was found pale, contracted, and motionless. If the heart was beating, larger amounts of the drug were given to other frogs; if in systolic standstill, smaller doses. My experiments were carried out on *Rana pipiens* as were those of Edmunds and Hale. The European observers have found *Rana temporaria* more susceptible to digitalis poisoning than *Rana esculenta*. I have reason to believe that the American frog (*Rana pipiens*) requires a considerably

larger dose of digitalis to produce systolic standstill than *Rana temporaria*. A study of the tables published by Edmunds and Hale show that none of the digitalis preparations they examined by Focke's method had a value (V) of more than 3.8, although Focke has stated that a good leaf should yield the value of 5.

During the past winter I tested digitalis leaves obtained from six of the leading apothecaries in Boston and from one in a suburban town, and from the pharmacies of the two largest hospitals. I also examined some powdered digitalis recently imported by Parke, Davis & Co., and kindly furnished to me by that firm's department of experimental medicine. I used as a control in my work powdered leaf prepared by Cæsar and Loretz of Halle, and the tests were made a short time after it was received from Germany.* The leaf had been standardized physiologically in Germany by Cæsar and Loretz and its strength measured by Focke's method was "V=5" or 0. 4 g.=100 g. frog weight. This titrated leaf comes in small mouthed bottles containing only 50 grams. A conspicuous label cautions the dispenser to keep the powder in a dry place.

The powdered digitalis of Cæsar and Loretz was found to be the most active of any tested. 1.4 mg. per gram of frog weight was found sufficient to produce systolic arrest of the heart in thirty minutes. As small a dose as 0.8 mg. caused the death of a frog within one hour, as is shown in the accompanying table.

TABLE I.

The Determination of the Amount of Digitalis Required to produce Systolic Standstill of the Heart of Rana pipiens in Thirty Minutes.

Protocol number.	Amount of digitalis per gram of frog weight.	Results.
4	.0004 gram	— 1hr.
6	.0008	— + 1hr.

* This was obtained through the kindness of Dr. Leo Mueller of the Heidelberg Medical Clinic.

Protocol number.	Amount of digitalis per gram of frog weight.	Results.
10	.0008	— + 1hr.
54	.0010	— + 1hr.
68	.0010	— + 1hr.
55	.0012	—
69	.0012	—
58	.0013	— (digitalis not well absorbed)
29	.0014	+
34	.0015	+
8	.0026	+

By far the best preparation I found on sale in Boston was the leaf put up by Merck. Two mg. of this preparation was the lethal dose per gram of frog weight, but 1.5 mg. per gram of frog weight was not sufficient to kill the animal. The powdered leaf recently imported by Parke, Davis & Co., killed a frog when 3.5 mg. per gram of frog weight were given.

TABLE II.

Minimum dose of digitalis leaf per gram of frog weight required to produce systolic standstill of the heart of Rama pipiens in 30 minutes:

Cæsar and Loretz.	
Powdered digitalis leaf	.0014 gram
Merck.	
Powdered digitalis leaf	.0020
Parke, Davis and Co.	
Powdered digitalis leaf	.0035
Allen.	
Digitalis leaf	
Hospital Y	.0040
Squibb.	
Digitalis leaf	
Apothecary D	.0040

Five different lots of Allen's English leaf obtained from four druggists in Boston and from Hospital Y were tested. Not one of these samples exerted any digitalis action when 3 mgs. were given. The preparation obtained from the hospital gave a positive result when 4 mg. were used. Two of Allen's preparations were tested in still stronger solutions, and 5 mg. per gram of frog weight were not sufficient to stop a frog's heart. Without doubt the preparations were once active, but had lost their strength through age and exposure to the air. Deterioration may occur before a can is opened, as the following shows: On Jan. 20th, 1910, I examined a supply of digitalis that has just been received by a local druggist. On the outside of the tin was the printed statement that on the 23d of July, 1908, this leaf had been tested at the pharmacological laboratory in Cambridge, England, and it was found that the lethal dose was .9 mg. for each gram of frog weight. I found that 3 mg. per gram of frog weight was not sufficient to produce systolic standstill in thirty minutes. The fact that more than three times the lethal dose as determined in England failed to kill the frog in my test can scarcely be explained by the difference in species. The can contained a pound of digitalis. As the leaves had already lost much of their activity when freshly opened it would not be surprising if they became wholly inert before the last of the pound was sold.

Two preparations of Squibb's digitalis were tested. One did not have a lethal action when 4 mgs. per gram of frog weight were used, and the other was inactive in amounts less than 4 mg.

A sample of digitalis prepared by the Shakers of Ayer was examined, and it did not produce systolic standstill when 5 mg. were given. This was the only digitalis leaf carried in stock by a large drug shop.

TABLE III.

Samples of digitalis that failed to produce systolic standstill of the heart of Rana pipiens when given in the following doses per gram of frog weight:

Allen.	
Apothecary A	.0050 gram.
" B	.0050
Squibb.	
Apothecary C	.0050
Shakers of Ayer.	
Apothecary E	.0050

Conclusions.

Nine samples of digitalis leaf obtained from six of the leading apothecaries of Boston and vicinity, and from two hospitals, proved to be of poor quality by biological tests. Only one strong digitalis leaf was found on sale, and this was carried in stock by one druggist who imports it. A bottle of Cæsar and Loretz's titrated leaf prepared and standardized according to Focke's method was obtained from Germany and shown by a series of tests to be twice as strong as the best leaf obtainable in the American market.

All digitalis leaf should be carefully dried, biologically tested, and packed in small bottles or other air-tight receptacles. Physicians should insist on obtaining the fresh active leaf. If tinctures are used they should be made from strong leaf of known potency, and given in 30 to 40 drop doses (using the ordinary medicine dropper), if prompt physiological effect is to be expected.

Probably the best mode of administering digitalis is in the form of freshly prepared pills from the powdered leaf or the powder alone, as recommended by Withering in 1785. "A medicine," he says, "whose fullest dose in substance does not exceed three grains, cannot be supposed to stand in need of condensation."

DISCUSSION.

Dr. C. H. Cook, of Natick:—Years ago I was called to see the patient of another physician in his absence, who was suffering from general œdema of a severe type. I prescribed an infusion of digitalis made from Allen's leaf, and the effects, as shown in the great increase of urine and the marked diminution of the œdema, were very satisfactory. I have for years used the powdered leaf in capsules, one grain each, as a "heart food," giving one to three capsules daily for months or sometimes for years, with excellent results in patients ranging in age from fifty to eighty-five years, the relief from dyspnoea and the steadying of the heart's action being very marked. In several cases the patients are now able to dispense with the remedy. During the last few years, however, I have noticed that I did not get the desired results as promptly as formerly. I think Dr. Pratt, in his exceedingly interesting and instructive paper, has demonstrated the reason why.

Dr. I. J. Clarke, of Haverhill: I would state that quite recently I had a case under my care where starting with a small dose of digitalis, by increasing the size of the dose very gradually and its frequency, I was obliged to administer up to 200 minims in 24 hours before I had much of any effect from the drug.

ARTICLE XLIII.

THE PRESENT STATUS OF THE TREATMENT OF EXOPHTHALMIC GOITRE.

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THE PRESENT STATUS OF THE TREATMENT OF EXOPHTHALMIC GOITRE.

In considering the subject of exophthalmic goitre we are immediately impressed by the tremendous rapidity with which our knowledge of certain aspects of it has advanced, for unknown and unrecognized comparatively few years ago, its bibliography now numbers many hundreds of articles in all languages. While it must have existed long, — perhaps for centuries, — before it was first described in medical literature, it was only after the attention of physicians was called to it by Parry that it began to be noticed. Dock,[1] in his comprehensive article on the history of the disease, tells us in a few pages all that we know of its history. The earliest description that he found was by Flajani, probably before 1820. Parry of Bath, England, gave in 1825 a fairly accurate and keen description of a case seen by him in 1786 of very marked exophthalmic goitre following confinement, and later he saw seven others. No other good descriptions of the disease were given until 1835 when Robert James Graves, a renowned physician of Dublin, described with great fullness three typical cases.

Following this, in 1848, came a very thorough article on four cases observed by Carl A. von Basedow of Merseburg, a small town in Germany. With this article was a full bibliography, and an inquiry into the pathology of the disease. Graves did not attempt to give a name to the disease but Basedow called it "goggle-eyed cachexia." The name "Basedow's disease" seems first to have been

used by Hirsch in 1858, and "exophthalmic goitre" and "Graves' disease" were first applied to it in 1860 by the great Trousseau who was a firm admirer of the Dublin physician.

A discussion on the disease in the Paris Academy of Medicine in 1860 created great interest in it and many articles soon appeared, including those of von Graefe and Marie and Moebius, and this interest has so grown that when Kocher made his great bibliography on the subject in 1902 he was able to find 1423 titles.

There have been few diseases as to the origin of which more theories have been advanced than concerning exophthalmic goitre. Heineck[2] mentions seven theories which have been held, among them the cardiac, which assumes that the tachycardia is primary, and the other symptoms are all secondary to it; the sympathetic, which assumes that all the symptoms are due to a disturbance of the sympathetic nervous system; the nervous, which has its basis in the fact that a neuropathic family history is found in some cases; the parathyroid and the thymus theories, which attribute the cause of the disease to disturbances in these glands, and finally, the thyroid theory, the one which carries greatest weight at present, and which is substantiated by clinical, experimental and pathological evidence.

Of the first four theories, that regarding the sympathetic nervous system is the only one which seems to have any evidence in its favor. Jonnesco[3] claims a considerable number of cures of the disease through severing the cervical sympathetic nerves leading to the thyroid gland, but there is practically no other advocate of this practice now. Changes have been found in the parathyroid glands in a number of cases but injury of these glands has failed experimentally to produce the symptoms of Graves' disease. Falta, who with Eppinger and Rudinger has done the best work on the relation of the glands of internal secretion,

explains the occasional occurrence of lesions of the parathyroids by saying[4] that "on account of the close approximation of the parathyroids to the thyroid gland, functional disturbances of the parathyroid may occur as a consequence of rapid strumous enlargement or inflammation of the thyroid." As for the thymus theory, autopsy statistics have not shown any connection between persistent thymus and Graves' disease. The theory that the thyroid gland is alone responsible for the disease is the only one that has survived, and this is borne out by experimental and clinical evidence. It is found that the administration of thyroid extract will produce the symptoms of the disease[5] and pathological examination of the thyroid gland in cases of it constantly shows changes proving that there is a hypersecretion of the thyroid juice either from an increase of normal thyroid tissue, or simple hypersecretion by a normal sized thyroid.

The manner in which the symptoms of the disease are produced by this hypersecretion has been much discussed, but from all the evidence it seems most probable that the secretion acts on the sympathetic system, perhaps directly on the *chromaffin substance* which it contains, which is in itself a gland, and therefore most likely to be acted upon by another gland as is so frequently the case. It is not impossible that we are dealing with a vicious circle. It is acknowledged that the glands are controlled by the sympathetic nervous system : something—in many cases apparently a mental shock — excites this system which brings about an increased thyroid secretion ; this in turn reacts on the sympathetic system for which it seems to have a special affinity. The thyroid is in this way still further stimulated and we have a vicious circle, the continued sympathetic stimulation showing its effect in the sweating, diarrhœa, nervousness, rapid respiration, tachycardia, etc. Another link in the chain of evidence in favor of the sympathetic theory is shown

by Falta,[6] who points out the fact that the cells of the chromaffin system and those of the medulla of the adrenal are similar; that the majority of the symptoms in exophthalmic goitre point to a hyper-irritability of the sympathetic system, and so too, adrenalin exerts its chief influence upon the endings of the sympathetic nerves.

It is perfectly possible for a gland to show great *hyperactivity* without actual enlargement just as do the salivary glands in a case of salivation. Furthermore, it is possible that some change in the *quality* of the secretion may produce the symptoms without any increase in the quantity.

The gland may be scarcely perceptible to the touch in a patient with very severe symptoms, and on the other hand the victim of a very mild attack of the disease may have a large goitre.[7] In this latter case the goitre is made up mostly of colloid,[8] but cystic or colloid degeneration may come on in plain goitre and may cause hyperthyroidism, probably by pressure on the thyroid tissue, just as in a polycystic kidney the pressure causes a nephritis. Again, a colloid goitre may suddenly become active and produce the worst type of Graves' disease, because nature suddenly tries to bring the degenerating gland to life again and creates a lot of new epithelium.[9]

Now a few words as to diagnosis. Palpitation and tachycardia are the commonest early symptoms; then, possibly, an increase in the size of the thyroid. Exophthalmos may be present relatively early, and then may follow some or all of the symptoms which we find in the most marked cases. Nervousness, an anxious expression of the face, pallor, tremor, diarrhœa, sweating, frequently a slight albuminuria, and occasionally glycosuria through a sympathetic disturbance of the pancreas by the thyroid as has been shown by Falta.[10] The signs (v. Graefe's etc.) found in the eyes may or may not be present. In practically every case, however, we find some abnormality of the heart. In

the earliest stages it is only rapidity of the beat, but before this has gone on very long we are sure to find some evidence of a myocardial affection, — weakness, irregularity in rate, rhythm or strength, and hypertrophy and dilatation. In fact, myocarditis of some degree is one of the most constant lesions of the disease.

In rare cases an abnormality of position of the thyroid may exist. We saw a short time ago a patient with extremely marked symptoms of Graves' disease, but were unable to find by palpation any traces of a thyroid. On percussion, however, there was dulness below both clavicles, and at operation (which was successfully accomplished), it was found that the case was one with a so-called "dipping thyroid," and that the lateral lobes were located in the position shown by percussion. Another case which came to our attention showed a very much enlarged left lobe in its normal situation, whereas the right lobe occupied the position of the apex of the right lung, and was nearly the size of a cocoanut. In cases like these we are often mystified by the very marked dyspnœa without any sign of an enlarged thyroid. This dyspnœa may come on only in attacks following "catching cold" or getting over-tired, or at the time of menstruation on account of the swelling of the thyroid at those times producing pressure symptoms, and is a great element of danger in that the pressure may give rise to emphysema and bronchitis and resulting in overloading of the heart with consequent cardiac failure, or the thyroid may swell suddenly and to a large size and suffocate the patient.

Kocher[11] has shown that there is a characteristic blood picture in the disease. In his analysis of 106 cases he shows that the red cells are somewhat increased and there is as a rule no anæmia. The white cells are most affected. There is a marked diminution in their numbers, going as low in one case as 3700 to the cubic millimeter. As a rule, the neutrophiles only are affected, being reduced often

to as low as 35% instead of the normal 50% to 57%. The lymphocytes on the other hand showed sometimes an absolute but more often a relative increase, even to 57% instead of the normal 25%. Werelius[12] says that this picture is characteristic of exophthalmic goitre and is most marked at the height of the disease, and it has been shown in many cases that the blood returns to its normal conditions following a successful operation. This blood picture agrees with the long recognized fact that starvation, cachexias and nutritive disturbances increase the lymphocytes in the circulating blood. Furthermore, in exophthalmic goitre we have, besides the profound change in nutrition, a marked chemotoxic action on the lymph system by the excessive thyroid secretion thrown into the circulation. The more severe the hyperthyroidism and its constitutional changes, the greater the lymphocytosis, and Kocher[13] contends that this condition is a contra-indication to immediate operation if such can possibly be avoided. The utmost endeavor, he says, should be made to treat these cases medically and restore their nutritive balance until the fall in lymphocytes shows that the patient's resistance has been so built up as to make the operative risk at least a reasonable one.

As has been already suggested, we may find hyperfunction and degeneration in the same thyroid gland. Thus we may have together the causes of exophthalmic goitre and of myxœdema, and it is the fact that we find cases presenting clinically symptoms of both diseases. These are patients in whom the major part of the gland has been destroyed by degeneration and who would be myxœdematous were it not for the fact that the preceding hyperthyroidism has produced a myocarditis which accounts for the tachycardia, while the exophthalmos and nervous symptoms persist. It may thus be seen that many cases,—in fact it is stated as many as 50%—are destined to recover from Graves' disease if they can be tided over the acute stage.

How may we best accomplish this? Two methods of treatment are open to us: surgical, by which we remove the cause of the disease, and medical, by which we endeavor to palliate the symptoms and keep the patient going,—and in this connection we want to emphasize the great importance of the medical man and the surgeon studying the cases together, for there is no disease in which each can work more to the advantage of the other than in this one.

Let us consider first the medical treatment, and this means to a great extent the treatment of the tachycardia, for when we allay that we also diminish the other nervous symptoms; and further, the heart is the organ most needing protection. In fact, the medical treatment of exophthalmic goitre may be expressed as the treatment of myocarditis:—in the early cases we treat it by prophylaxis, try to prevent its occurrence,—in the later cases we try to remove its cause, and in very late cases we try to palliate the existing condition and save what heart muscle is left.

The etiology of this myocarditis has been disputed. It is by some regarded as a result of overwork through pressure on the vagus, by others as a result of direct toxic action on the myocardium by the thyroid secretions, and by Romberg and others as a result of nervous stimulation.

In some cases the direct cause of an overworked and later dilated heart may be the emphysema and bronchitis brought about by compression of the trachea or bronchi by a large thyroid, but in the greater number of cases it seems to me that the cardiac condition is brought about by a primary stimulation to greater rapidity by the thyroid secretion, with a resulting malnutrition of the heart muscle on account of the shortened diastole.

In the treatment of this condition we resort to these measures:—*to rest the heart and to diminish the thyroid activity*. Here the most important factor is rest,—absolute rest,—not only physical, but mental rest, as well. Since

the patient is usually in a very highly nervous condition we must first insist upon her remaining in bed, in the quietest room in the house, or in some place away from home, especially in cases where there is any exciting or worrying factor in the household, or indeed anything to modify the most perfect conditions for mental quiet,—in short the so-called "Weir Mitchell rest cure" should be rigidly enforced in its strictest form. To care for the patient we must find a nurse whose effect on her will be soothing. The diet must be nourishing and easily digested, tea and coffee forbidden or greatly limited, and alcohol and tobacco absolutely forbidden. The tachycardia, and to some extent the nervous symptoms can often be markedly diminished by an ice bag over the præcordia, and occasionally constant cold applications over the thyroid are also of value by retarding the action of the gland and thus diminishing the output of secretion. Cold sponges, cold wet packs, and in some cases prolonged cool baths are found to exert a marked soothing effect. At times the bromides in doses of 10-30 grains three times daily may be successful in diminishing the tachycardia and nervous symptoms, but opium should be avoided whenever possible.

The drugs usually used in cardiac cases we find of little avail. Digitalis, our common reliance in slowing the heart beat, has little effect since it does not reach the cause of the tachycardia, and in exophthalmic goitre it easily causes gastric upsets. Strophanthus and sparteine sulphate are also of little use, but in some of the more advanced cases with cardiac weakness small doses of strychnia are sometimes valuable. We have found in a large series of cases that the drug which gives the best results has been the neutral hydrobromide of quinine, the use of which was first suggested by Dr. Forchheimer of Cincinnati. It is important that a strictly neutral salt be used, as the acid salt which is frequently dispensed does not give as good re-

sults, and we have had the best success with that made by Parke, Davis & Co. It is given in capsules containing five grains each, and to the limit of the patient's tolerance, which is rarely more than three or four capsules a day. Toxicity is shown by the appearance of tinnitus, and no further ill effects are experienced if the medicine is temporarily stopped when this appears. The administration of this medicine must be continued for a long time and it is well to tell the patients in the beginning that they will probably have to take it for months or even for two years or so. If this is not done the patients are apt to become discouraged if they see no marked results after a few weeks. Very frequently the patients notice after a week or two of the treatment a diminution of the palpitation, the sweating, the tremor, and other nervous symptoms, and in many cases the thyroid diminishes in size. The exophthalmos seems to be the last of the signs to disappear, and this may not be until the expiration of two or three years, while rarely the exophthalmos and tremor may persist more or less even after all subjective symptoms have disappeared. When this last occurs, the dose of the drug should be cut down even to two or three capsules a week, the patient being cautioned, however, to resume immediately the former dose at the first appearance of any of the old symptoms.

Our cases have often proved to us the close connection between the thyroid gland and the genital organs. For instance, we have noticed that if the patient becomes pregnant the symptoms are often held in abeyance during the pregnancy, returning however, after confinement. Again, relapses may occur at the menopause, and in fact one of us has just seen a case that has been entirely well for seven years, but has recently had a relapse coincident with the climacteric. When relapses occur, as is not uncommon, an active resumption of the treatment quiets them quickly. We are not certain how the quinine acts, though it seems

most probable that it acts on the sympathetic system, and thus puts an end to its stimulation of the thyroid and the vicious circle which has already been mentioned We can easily assure ourselves of its specific action by discontinuing its administration in any case and noting the prompt return of symptoms.

In tabulating the results of this treatment on our patients at the Massachusetts General Hospital two years ago with Dr. Mead, it was found that of 56 cases under observation for from three to nine years, whom we were able to examine and talk with, 76% had had no signs or symptoms for two years, while 13% had been benefited, and only six cases (11%) could be considered failures. These cases which we regard as cured are able to perform their ordinary daily work. It is, of course, the early cases that do best under this treatment, and in the very advanced cases with organic changes in the heart we can hardly expect a cure, but we do often see a radical change for the better.[13a]

With thyroidectin, the dried and powdered blood of thyroidectomized goats, we have not obtained satisfactory results. Moebius[14] reports several cases in which the symptoms have been diminished by this treatment, but he has not published any cures through its use. Some of our early cases were treated by subcutaneous injections of the serum of thyroidectomized goats, and in a few cases we got good results, especially on the exophthalmos and on the goitre. The serum is, however, very expensive, and some patients object to the frequent injections; and further, it is not a treatment that can be carried out by the patient at home. The milk of thyroidectomized goats in its original or the powdered form, and "Rhodagen," a preparation made by drying the proteids precipitated from the milk by alcohol, have been used to some extent abroad, but they are hard to get, are expensive, for the goats soon become myxœdematous, and furthermore, no marked benefit has ever been reported from their use.

A few years ago Rogers and Beebe[15] of New York brought to our notice a serum treatment. Believing that the symptoms of the disease are caused by hyperactivity of the thyroid, they prepare a serum which is to neutralize, as does an antitoxin, the toxic action of the proteid in the thyroid secretion, and also by its specific toxic action on the secreting cells of the gland to diminish or stop the manufacture of these injurious proteids.

To prepare this serum the proteids are extracted from fresh human thyroid and injected into animals. After several doses have been given, the blood of these animals, which has now become loaded with antibodies, is withdrawn and the serum injected into the patient.

In certain types of cases[16]—those in the transitional stage, where the formerly hyperactive thyroid is undergoing colloid degeneration and where we find a curious mixture of the symptoms of Graves' disease and myxœdema—Rogers and Beebe use what they term the "combined treatment." In this they use the serum we have just described to combat the conditions of hyperthyroidism, and at the same time give an extract of sheep's thyroid to neutralize the hypothyroidal or myxœdematous conditions caused by the degeneration of part of the gland. One would naturally think that the serum would neutralize the extract of the sheep's thyroid, but this, the authors claim, is not the case. Rogers' latest published results[17] are not as good as his earlier ones, for in 480 cases of all grades he claims only 15% of cures, removal of the subjective symptoms in 10%, and 50% improved to such a degree that they disappeared after one or two months' treatment because of the relief of symptoms. These cases, then, are lost, and we do not know whether they are better or worse. Seventeen per cent. were unimproved, and 8% died from the natural course of the disease.

They lay great stress on the importance of properly se-

lecting the cases suitable for the different treatments and on the amount and frequency of dosage, and say that it is impossible to make hard and fast rules, but each patient must be carefully studied and treated accordingly. Exophthalmos and goitre are the last signs to disappear, and while the latter persists the patient must avoid mental or physical over-exertion for fear of a return of the symptoms.

The principal objection raised to this form of treatment has been the possibility of injury to the rest of the organism by a cytotoxic serum strong enough to act upon any one of the tissues as this serum is supposed to act upon the thyroid epithelium.

Electricity in several forms has been used by a good many, but there is very little evidence that any form of it is of value except the X-ray. Cook,[18] Beck,[19] Freund,[20] Price,[21] Holland,[22] Garré,[23] and others report excellent results from its use, and all report a very great drop in pulse rate after two or three treatments, in several cases the pulse dropping to normal after a few exposures, and with this a great improvement in the subjective symptoms. It is thought that the X-ray causes the secreting tissue to shrink, and perhaps to some extent kills it, and in this way the secretion of the toxins is checked. As an adjunct in certain cases this treatment is certainly of value.

Let us now consider the other alternative, surgery; and first let us emphasize the importance of the surgeon's being an expert at thyroid operative technique, for the liability of injury to the parathyroid or to the recurrent laryngeal nerve and of hæmorrhages in the hands of the inexpert are too great to be overlooked. What are the indications for operation? The opinion of some surgeons is still that *diagnosis is the indication for operation*,[24] but that opinion is one which should be considerably modified in view of the success of medical treatment in a good percentage of cases. Certain types of cases require prompt operative treatment.

Such cases are those in which the goitre is a mechanical danger, as, for instance, when it compresses the trachea or œsophagus,—or both. Here you get interference with swallowing or with breathing, and frequently cough, and occasionally a dangerous bronchitis. The diagnosis is easy in the ordinary case when the enlarged thyroid can be palpated, but in cases with "dipping thyroid" the diagnosis is sometimes very blind. The greatest danger lies, not in the continued bearable pressure, but in the liability to sudden enlargement of the goitre, which not infrequently occurs, and which may quickly suffocate the patient. This point has been very strongly impressed upon us, for we have seen three cases die in this way while awaiting operation. Furthermore, this danger is so great that immediate operation is indicated in any case in which a dipping thyroid is found, even though the symptoms of exophthalmic goitre be very slight, as may happen.

Operation is also indicated when exophthalmos, by preventing closure of the lids, endangers the eyesight through corneal ulceration, or when after three months of good medical treatment there is no marked improvement in tachycardia or in the patient's general health, or there is an increase in the intoxication by thyroid secretion, even though no enlargement of the thyroid can be demonstrated.[25] Cases with beginning cardiac involvement,—*i.e.*, myocardial weakness,—as shown by a pulse of 130–160, or one that suddenly fluctuates in tension and rate, should be operated upon at once in order to save the heart,[26] while in cases that have gone beyond this point, and have arrived at the stage where the myocardium is badly diseased and the aggravating symptoms of exophthalmic goitre are still present, operation must be considered a last resort, not expecting a cure, but merely as an effort to prolong life by taking strain off the heart. If there is anæmia with swelling of the feet, Mayo[27] puts the patient on rest and

belladonna for some days, and in the severer types uses in addition the X-ray for two to six weeks. Riedel[28] emphasizes the importance of avoiding operation if possible, if there is any bronchitis from compression, since it increases to so great a degree the liability to broncho-pneumonia, but in these cases it is usually better to risk the consequences of an operation than to risk a sudden swelling of the thyroid and a resulting death by suffocation.

Then there is another side of the question that must be considered: — the circumstances surrounding the patient. For instance, if our patient is a business man, dependent on himself and unable to give up the long time necessary for medical treatment, and he is unable to go on in his present condition, immediate operation offers the best solution of the problem.

We shall not go deeply into the methods and technique of surgical treatment. Of the procedures[29] which remove the thyroid tissue, excision, as done by Kocher, and resection, as done by Mikulicz, are most frequently done, while Porta and Socin's method of enucleation without disturbing the posterior portion of the capsule offers the least liability of injury to the parathyroids with the resulting tetany. This, however, is a very uncommon accident at the hands of experts. Horsley's procedure of division of the isthmus on the assumption that it would be followed by atrophy of the lobes has not been successful, and excision of the cervical sympathetic ganglia as proposed by Edwards and later used by Jaboulay (1896) and Jonnesco has been proved experimentally by Schiff to have no effect on the thyroid. Curtis,[30] however, reported in 1903 that Jonnesco had done seventeen bilateral operations of this sort with 60% of perfect cures and no deaths. Ligation of the thyroid arteries,—Wolfler's operation,— is of value. In some cases this alone has produced cures, but it is most valuable as a preliminary to the radical operation in severe cases.[31]

There is the danger of including the recurrent laryngeal nerve in tying the inferior thyroid artery with resulting laryngeal paralysis and inhalation pneumonia, so great care should be taken that this does not occur. Ligation of the superior artery and vein, as is now done especially by the Mayos, is safe but in many cases is not sufficient. In their latest paper[32] they report 2% of deaths within a few days after operation. For some unexplained reason acute thyroid poisoning may follow either of these last two methods of operation as well as those in which the thyroid tissue is cut and otherwise subjected to trauma.

Crile[33] lays special emphasis upon the importance of mental quietude preceding the operation. He so handles the patient by rest and sedatives that she is not worried and excited by the approach of the operation, nor is she conscious of taking the anæsthetic; and indeed, he claims that the patient in some cases does not realize that the operation has been done. This method he terms "stealing the gland," and certainly his results are remarkably good.

Quiet *following* the operation seems to me to be equally important, for frequently the patient is fuller of thyroid toxin at this time than at any other.

Capelle[34] has called attention to the importance of ascertaining when possible the presence of a persistent thymus, for in unexplained cases of death following operation, the thymus was found in many cases to be of the size commonly found in the new-born. This gland, lying just behind the upper part of the sternum, is very difficult to make out by percussion, particularly as it lies surrounded by a mass of fat which not infrequently leads to a wrong diagnosis. The X-ray helps us very little if any here, and if we find dulness on percussion over this region we are between two risks, that of operating in the presence of the apparently present thymus, and that of depriving the patient of the benefit of an operation when the mass is a false thymus consisting merely of fat.

It is well known that persistent thymus predisposes to death under ether, and in many cases collected by Capelle death occurred ten to twenty hours after successful operation, with gradually increasing weakness of the heart without apparent cause. In other cases there was sudden death during the operation. Capelle does not believe that hyperthyroidism has anything to do with the sudden deaths, but considers the thymus responsible. In sixty such cases following operation for Graves' disease 79% showed a large thymus, and of the cases of Graves' disease which died of intercurrent diseases 44% had large thymus. Of those who died of exophthalmic goitre alone, 82%, and of those who died during operation 95% had large thymus. Its presence then, if it can be made out surely, contraindicates operation.

Another contraindication to operation is an acute exacerbation of the symptoms. If this occurs we must treat with rest, baths and sedatives until the symptoms subside. Furthermore, the condition of the heart must be carefully considered and the effect of exercise or excitement studied. In other words, if there is dilatation, marked hypertrophy or myocarditis, operation should be avoided. This means that operation, if done, must be done before any advanced symptoms of cardiac involvement appear; and it is very poor judgment to advise operation in any desperate case.

Following operation, we expect a very marked diminution in the subjective symptoms in a large percentage of cases. The exophthalmos and tachycardia, however, may persist or even increase after the operation, and a total disappearance of exophthalmos can be expected only in those cases in which operation is done early. A case is occasionally seen in which the exophthalmos has increased after operation, though the pulse may be normal. We have recently seen a case in a girl in whom the operation removed all symptoms; she feels and apparently is perfectly well, her pulse is 80, and she is

living her ordinary life, but with a steadily increasing exophthalmos, which may in time endanger her eyesight.

The theoretical course of goitre is to go on to degeneration, which means myxœdema in the end. If this is true, it may be said that by removing a large portion of the gland, we are merely hastening the advent of myxœdema, and yet in the cases in which operation has been done years ago myxœdema has not yet appeared. This may be owing to the fact that other glands, perhaps the chromaffin system (that is, the cells we find in the medullary portion of the adrenals and scattered through the sympathetic system, particularly in the ganglia), takes up some of the functions of the degenerated thyroid.

Now to sum up in a few words: In practically every case it is our duty to treat the patient medically as I have already outlined, for three months. If, at the end of that time, no improvement has taken place, preferably ligate the vessels. This may effect a cure. If it does not and the patient later comes to the operation of partial thyroidectomy,—which is as yet the most satisfactory of the radical operations, — the ligation will make the operation easier and less dangerous. If the goitre is very large, it is well to remove only the larger lobe and then treat the remaining lobe with the X-ray and medical procedures.

Cases that show beginning cardiac failure should be operated upon as soon as possible after putting the patient in fair condition by medical treatment. Many cases, however, come to the doctor only after the myocardial changes have begun. Patients in this condition must be treated as cases of advanced myocarditis, for all treatment beneficial to this condition is also beneficial to the exophthalmic goitre. The treatment, which I have mentioned,—the strictest rest, with ice bags over the heart and thyroid, a carefully regulated diet, the hydrobromide of quinine, and if necessary the cautious use of strychnia and bromides,—must be car-

ried out. We must not expect an absolute cure in the cases where the myocarditis is advanced, though symptomatic recovery does sometimes occur, and we can hope only to lessen the symptoms and make life better worth living for the patient and the patient's family. The earlier cases we may be able to cure, and if not we may, by careful medical treatment, improve their condition to such an extent that they can be operated upon with much less danger than before treatment.

Gentlemen: — The last word in the treatment of exophthalmic goitre has not yet been said and we are still a good deal in the dark regarding it, but I hope that I have made clear to you the indications for treatment which have met with the greatest success so far.

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DISCUSSION.

Dr. C. Frothingham, Jr., of Boston: As Dr. Jackson's complete paper seems to cover the whole subject, I will simply try to emphasize a few of the points which seem to me to be of special interest. Although it is pretty generally admitted that the disease is due to a hyper-secretion of the thyroid gland, the cause of this increased secretion is not clear. From a morphological point of view some pathologists say that there is an increase of glandular epithelium shown by infoldings. Other pathologists, however, deny that this condition is specific for Graves' disease. The chemists find some variation in the chemical properties of the gland in certain cases which might call forth an increased secretion, but no definite condition common to all these cases. Recently Dr. John Rogers of New York has worked out an elaborate theory for this hyper-secretion dependent upon the inter-relation between the chromaffin system, the pancreas and the thyroid. This theory up to the present time lacks confirmation by experimental evidence. In addition to the increase of secretion is the possibility of the increased secretion being abnormal. On this point there is considerable difference of opinion. Thus it is evident that there is a big field open for more work directed towards clearing up the true nature of this disease.

There is one point in regard to diagnosis which should be emphasized and that is the question of whether the individual case is one of hyper- or hypo-secretion. For after

the hyper-secretion has ceased and there is even a diminution of secretion, the symptoms of exophthalmos and tachycardia may persist. In these cases the exophthalmos has become permanent due to structural changes, and the tachycardia is the result of myocardial degeneration. To operate in such cases in order to diminish the secretion would, of course, be useless. Careful history taking and physical examination ought to clear up the point.

Whether or not to advise surgery in the treatment of this disease is difficult to decide. This is due to the fact that the present statistics are unsatisfactory. They are unsatisfactory for two reasons; the same authors rarely compare good medical treatment with the same treatment plus operation, and authors will not confine their reports to only those cases that have been observed many years. That surgical intervention will give more prompt temporary relief, seems pretty well established. The uncertainty exists in the end results. Therefore the circumstances of the patients make a considerable difference in the line of treatment to be advised. For proper medical treatment the patient should have absolute rest. This of course is impossible for patients in our big general hospitals and for the poorer classes in their homes. Therefore, unless future statistics show that the end results of surgical treatment are a failure, some form of surgical treatment should be recommended for those who can not afford proper medical treatment, earlier than for those who can.

Dr. C. A. Porter, of Boston: I have just read a paper upon the surgical treatment of exophthalmic goitre (see Article XLV, page 937) in which I endeavored to make a plea for surgery in selected cases in which adequate medical treatment for a number of months did not prove successful. I tried to bring out clearly that in operating upon cases of Graves' Disease, the object of the operation is different from surgery in cases of fibroids of the uterus or diseases of the appendix. In the latter, surgery may properly be said to cure, that is to remove the cause, but in exophthalmic goitre, all the surgeon can attempt to do is to modify the function of a gland which for various reasons is functionating excessively or abnormally. It must therefore be understood that the results will be good or bad, depending upon the

wise selection of cases and the operation done; whether it be ligation of the vessels or partial thyroidectomy. I feel quite sure that too many cures have been claimed both to medicine and surgery, without waiting an adequate time to see what the end results will be. The general practitioner must remember that there is a mortality from 8 to 10% under medical treatment. This mortality, I believe, could be very distinctly reduced, probably halved, if surgery had been resorted to at an earlier period. We must never forget that this disease, once advanced to a certain stage with accompanying degenerations of the heart, nervous system and vessels, is absolutely incurable, though under medicine or surgery, the patient's condition may be somewhat improved. Whoever has seen a case of acute hyperthyroidism successfully operated upon cannot doubt that the diminution of secretion of the gland has struck at the root of the evil. I feel that in Graves' Disease, we have one of the best opportunities for co-operation between the physician and surgeon, and the use of experience and judgment in the selection of a time when medical treatment should cease and surgery begin.

Dr. J. C. Munro, of Boston: I have just been congratulating them up-stairs on the brotherly love that is dawning between the surgeon and the medical practitioner. I indorse everything that Dr. Porter said.

Dr. Eben C. Norton, of Norwood: I would simply add that I have used serum in three cases of exophthalmic goitre, in one case beneficially and in two cases negatively.

ARTICLE XLIV.

EDUCATIONAL METHODS IN THE ANTI-TUBERCULOSIS CAMPAIGN.

By JOHN B. HAWES 2d, M.D.
OF BOSTON.

READ JUNE 7, 1910.

EDUCATIONAL METHODS IN THE ANTI-TUBERCULOSIS CAMPAIGN.

THE two most important factors in the campaign against tuberculosis are:

(1) The isolation of the advanced consumptive, thus preventing the spread of the disease, and

(2) The education of the public and of the medical profession in regard to the nature of the disease, thus bringing about its early detection and treatment. This at least is the attitude of Massachusetts toward the tuberculosis problem.

The new sanatoria recently opened at North Reading, Lakeville and Westfield, are primarily for the segregation and isolation of the advanced consumptive.

The medical profession of the state, as represented by these Associated Committees, in conjunction with the Massachusetts Commission on Hospitals for Consumptives, the Health Inspectors of the State Board of Health, and the numerous local anti-tuberculosis associations, are carrying on a campaign of education. The various methods employed, and the relative advantages and disadvantages of each, it is the purpose of this paper to discuss.

For many years we have been trying to educate the public in regard to tuberculosis. Ten or fifteen years ago, however, it was only the consumptive public whom we tried to educate and that only in a desultory way. At that time, at any out-patient department, as for example at the out-patient department of the Massachusetts General Hospital, a consumptive coming for advice was told to take the examination for the Rutland State Sanatorium. If for any rea-

son he was unable to do this, or if he was not accepted at this institution, he was handed a tract elaborately printed in whatever language he spoke, in which directions were given as to how he should live. "Take this tract" said the doctor, "put it on your bureau or wall at home, read it and learn it, and by following its directions you will get well." I am very doubtful if this method did much or any good. Indeed I think it did harm in that it filled patients with a false sense of security in regard to themselves and the disease. Education to really educate must be more effective than this. One can easily prescribe an appropriate drug for a given ailment, but unless one sees that it is given in the proper doses, at the proper time, and that the directions in regard to its administration are carefully followed out, it will do more harm than good. It is the same with educational methods—unless we see that the facts we present are made effective, that they are really understood, and that directions are followed, we could plaster the walls of our tenements with tracts and accomplish nothing. I shall describe certain methods which have been found effective for adults and for children.

1. Educational Methods Suitable for Adults.

(*a*) *The Tuberculosis Exhibit.*

This was perhaps the most effective method of education at our disposal. In this state I believe that it has done its best work and that the time of its greatest usefulness is past. In certain localities, however, it is still very valuable.

The large traveling exhibit of the Boston Tuberculosis Association was invaluable in arousing interest. This has now been fairly well aroused throughout Massachusetts and our present energies may well be directed toward guiding the efforts of all who are interested and anxious to do some work for the campaign. These efforts must be largely spent in educating the ignorant, who require individual

teaching, rather than what can be shown by means of large exhibits.

The exhibit used in this state, managed by the Boston Tuberculosis Association, is now in storage where it will probably be kept for a year or more, after which it will doubtless be sent on another tour. In the meantime I strongly urge the formation of small, compact exhibits, such as that which has been prepared for school purposes—to be described later. Such small exhibits can be made at little cost, require no attendant to travel with them, and will be of the greatest assistance as a means to illustrate talks on health and hygiene, as well as on tuberculosis—given in shops, factories, or before labor unions, women's clubs, or other small groups of people who can be talked to in an informal way. Such an exhibit, put up in a prominent place in a store or factory, would, I believe, do a great deal of good if the attention of the employees was called to it and a few demonstrations given as to what it meant.

The school exhibits, which I shall destribe later in detail, are not designed to fill the need for such an exhibit mentioned above but merely to serve as examples, which tuberculosis associations and school committees can obtain at a low price.

(*b*) *Press Articles.*

At the offices of the State Tuberculosis Commission, 3 Joy Street, Boston, every two weeks a short article in regard to tuberculosis is sent out to about 200 newspapers in Massachusetts. These articles are prepared either by the National Tuberculosis Association or by the Commission. They are given a wide circulation. Such a method as this has the advantage of reaching a very great number of people at a very slight cost. The exact amount of good which it does it is hard to estimate. By itself I do not believe that this method of education will accomplish much, but where any anti-tuberculosis campaign is active, and as a

part of such a campaign,—by pointing out to every one what is being done, and how and where information may be obtained, etc., I believe that press articles will do much good. Salem has carried on this method of education in a most effective way, combining articles of general educational value with those of general interest. Gardner is following suit with a series of articles on tuberculosis which appear in the local paper. In scattered agricultural communities, where it is very hard to get geople together in large numbers for lectures, exhibits, etc., the public press should be used far more than it now is for educational purposes. In such districts as Barnstable, etc., the daily or weekly paper is read with the greatest of care, advertisements and all, and each item is discussed at length in the home. Short, breezy articles on health, hygiene, fresh air, etc., will rereceive eareful attention and do a great deal of good. All such articles should be written in what is called "newspaper" or "journalistic" style: if not, either the editors will not publish them, or if published they will not be largely read.

(*c*) *Lectures, Talks, etc.*

The amount of good to be accomplished by lectures, talks, etc., depends largely on the speaker's ability to size up his audience and to talk in a language suited to its needs. In Boston many young physicians are called upon to address various labor unions, groups of factory employees, etc., on the subject of tuberculosis. Many such talks, given by young hospital graduates, while they deeply impress the listeners with the learning of the doctor, convey very little information to them. It is hard in a lecture of this kind to put things in simple enough terms. Such talks should be absolutely informal and should be short—not over fifteen or twenty minutes. The speaker should impress a few facts upon his hearers and see that these facts are clearly understood, rather than attempt to give a general sketchy

outline of the whole subject. He should drive home his facts by local allusions. If he is talking to the Cigar Makers' Union, the dangers of this occupation should be emphasized; if he is addressing a Bakers' Benevolent Society, the need of cleanliness, etc., should be dwelt upon.

Lectures to women's clubs offer great opportunity to arouse enthusiasm and awaken active interest. Such audiences are usually of a rather intelligent order, and in addressing them one need not "talk down" to any very great degree. The majority of women's clubs need waking up. A purely scientific paper will not do this. Women are at heart sentimentalists, and the recital of a few striking examples of harm done by neglect or ignorance of this disease will do more good than many facts. A description of active work carried on by other women's clubs will stir up local interest and help to get things done. If I am speaking in Lawrence, for instance, I am very apt to describe in glowing terms how the Quincy Women's Club raised the money to hold the tuberculosis exhibit, formed an anti-tuberculosis association, and helped to establish a day camp. Most important of all, no speaker should conclude his address before a woman's club without mentioning one or two lines of practical work which such an organization could carry on, and which he has found out beforehand are much needed. Lectures in churches and before tuberculosis associations should be of a similar nature. I believe no talk should be over thirty minutes in length. Lantern slides, given after the talk, with a brief description of each, pointing out what it teaches and how it applies, are of the greatest help. A sense of humor judiciously used will help to maintain interest in what at best is a most serious subject. At the end of many talks which I have given the presiding officer usually states that the doctor will be glad to answer all questions, etc. An embarrassing period of silence almost always follows, unless some anxious parent arises to ask

what should be done in the case of Nellie or Johnnie. I well remember one such instance, when a most charming old lady asked me whether or not I advised young ladies to use silk underwear. Unless certain people are prepared beforehand to ask intelligent questions it is usually far better to omit this so-called "discussion."

(*d*) *Cards, Placards, etc.*

Prominent anti-spitting signs of course accomplish some good. I do not believe they accomplish very much, however, unless once in a while the Board of Health of the community in which these signs are posted enforces the law, causes a few arrests to be made, and publishes articles in the local press, explaining why this is wise, proper and necessary. Posters, circulars, etc., giving facts in regard to tuberculosis, without any local information, I do not believe accomplish much. Large posters, such as are used in New Bedford, telling people where and when they can be examined and secure treatment, are really valuable. Attractive calenders, with pictures of Rome, Venice, Syria, or the home country of the people for whom they are intended, with information in regard to tuberculosis and the local dispensary, etc., will be hung up in every home and will be noticed. Such calendars as gotten out by the New York Charity Organization Society and the Boston Tuberculosis Association, are not expensive, costing approximately $30.00 — $35.00 per 1000. Elaborate pamphlets, such as that printed by the Illinois State Board of Health, which is perhaps the best of its type, and others as printed by our board of health and the tuberculosis association, etc., will do good only among the more intelligent classes and will hardly reach those where the need of such information is most urgent. They are also more expensive.

At the Commission offices we have recently prepared a small folder of stiff pasteboard to be placed in the pay envelopes of employees in large factories and other concerns.

10,000 of these were prepared for the General Electric Company of Lynn. Brockton, Pittsfield, Clinton, Salem, Fitchburg and other places have adopted this idea. In addition to certain information in regard to tuberculosis, the address of the local dispensary is given and the days and hours when patients can be examined and secure treatment are stated. Such cards cost $24.00 per 5,000; $43.00 per 10,000. Information in regard to these can be secured at the Commission office. In Fall River they have placed short notices in regard to tuberculosis inside the covers of the school books. This is a cheap and efficient method of calling the attention of the children to the subject.

(*e*) *The Trained Nurse and Social Worker.*

As was stated in the beginning of this paper, it is the trained nurse or social worker who is to make these educational methods effective. Despite some pessimistic reports which reach us from Baltimore, where apparently they have come to the conclusion that the trained nurse cannot accomplish very much in the homes, I firmly believe, and I think we all believe, that it is the trained nurse or trained social worker, seeing patients in their homes and in the workshop, who is the great factor in any educational campaign. A splendid example of such an educational work is that now being carried on at the immense factory of the Dennison Manufacturing Company in South Framingham. During the past year this concern has employed a nurse who devotes all her time to seeing that the working and home conditions of the employees are satisfactory. She takes the sick to the doctor or to the hospital for treatment; those who are run down or in poor health she studies, helps and advises, and most important of all she goes into the homes and teaches these people how to live. The good that women can do in this way as nurses, or social workers, or trained volunteer visitors, is enormous. It is limited solely by their number or by the means to pay for their services.

II. Educational Methods best suited to Children.

(*a*) *The School Nurse.*

Here again the nurse is the important factor. Physicians can examine the children, legislatures can pass laws directing that there shall be instruction in tuberculosis, its prevention, etc., teachers can be provided with information on the subject, but unless there is a woman medically trained as regards the disease, socially trained to cope with social problems, and most important of all, trained or endowed by nature with tact and good sense, little will be accomplished among the children. The importance of this cannot be overestimated. Every one agrees that it is hard or impossible to get adults, particularly among the lower classes, to change their set ideas and methods of living. It is by dealing with the children that we are really going to control tuberculosis, not in this generation nor in the next perhaps, but some time in the future. Pittsburg, under the leadership of Dr. Charles William White, is doing this educational work among children in a most effective way. After a great deal of difficulty permission was secured from the Board of Education and from the boards of control of the different public schools to teach the children in regard to tuberculosis. A trained nurse and social worker was secured and well paid to devote her entire time to going around among the different schools and giving short talks. In taking up this work in any individual school a preliminary meeting was held with the superintendent, teachers and janitors, at which the nurse explained her plans. Next the nurse gave fifteen-minute talks to the children, taking them in small groups, going from classroom to classroom. After school hours the mothers were invited to attend a meeting at the school, where the same subject was gone over from a somewhat different point of view. Later on the children were given an examination or asked to write an essay on what they had learned. The school nurse coöperated with

the school physicians and with the parents and children in their homes.

No system quite so elaborate as this has been carried out in this state. On a small scale, however, it has been done. In Canton, for instance, there is a school nurse who not only gives talks to the children and to the teachers at the school, but follows the children into their homes, becomes well acquainted with the mothers, and gives instruction in proper methods of living. The Boston school nurses are doing magnificent work. Without such a school nurse I do not believe that the teachers alone can do very much effective teaching in hygiene and allied subjects. According to Chap. 181 of the Acts of 1908, a law was passed that "In each of the subjects of Physiology and Hygiene special instruction as to tuberculosis and its prevention shall be taught as a regular branch of study . . . " etc. In accordance with this act, and at the request of the State Board of Education, a committee of Boston physicians prepared a pamphlet on the subject of tuberculosis, a copy of which was placed in the hands of each teacher in the state. In comparatively few places was there a school nurse to give this instruction or to make this law effective, and as a result I do not believe that this law, beneficial and wise as it was, has as yet accomplished very much. The majority of teachers are already overworked and can hardly be expected, either on account of lack of time, or lack of training, to give this instruction; it is the school nurse who can do this, and it is the appointing of such nurses which will prevent this law from becoming a dead letter, as in many instances it now is.

(b) School Tuberculosis Exhibits.

A bill has recently been passed by the Legislature, introduced by our Associated Committees, giving an appropriation of $1,000 to prepare small "school tuberculosis exhibits." Such an exhibit will show graphically what tuber-

culosis is, what it does, how it is spread, how cured, and most important of all, how prevented. This exhibit, now that the original plates, frames, etc., have been made, can be duplicated for $30.00 to $35.00. Upon request certain frames will be left vacant in order to insert pictures or charts of local interest. It is planned to place such an exhibit as this, as far as can be provided out of our small appropriation, in public schools in the state, and to have it go from classroom to classroom, perhaps remaining some months in one school. It is to be used as a means of illustrating talks given by school teachers, nurses or physicians on health, hygiene, tuberculosis, etc. Our appropriation can only provide us with a small number of such exhibits. It is hoped that school committees and local tuberculosis associations will take up this work and duplicate these exhibits throughout the state. Such an exhibit as this will do a great deal toward making instruction in regard to tuberculosis and its prevention effective.

(c) Outdoor Schools, etc.

The value of the outdoor school or of the "outdoor room," one of which is being arranged for in each public school in Boston, as an educational factor, is immense. Parents are bound to be deeply impressed by the rapid improvement in the condition of their children, and the lessons learned at such a school concerning fresh air, good food, cleanliness, etc., are sure to be discussed in the home.

In Cambridge, Salem and elsewhere school children have been given examinations and have written essays on health and hygiene in addition to their regular studies. Such examinations as these, if of a practical nature and supplemented by other means of education, are sure to do good. I recently looked over examination papers written by a child of eleven and a child of fourteen in a Salem school, and I can merely say that if the average child knows as much about tuberculosis, or if the answers to the questions repre-

sent what the children really know, that in the next generation Salem will have consumption well under control.

III. Indirect Educational Factors.

Among such indirect educational factors may be mentioned the sanatorium and camp, and the tuberculosis class or dispensary. The sanatorium acts in two ways—first as a striking example to those people in the immediate neighborhood in regard to outdoor life, and next, by the influence and example of those patients discharged as arrested or cured. This latter factor, however, may work for evil as well as for good. Unless the discharged patient is placed in touch with the local tuberculosis association, dispensary or nurse, there is grave danger of a rapid relapse, which will place this example of the value of the sanatorium treatment in a most unfortunate light. There is no need of emphasizing the good done in an educational way by children or adults attending a properly conducted tuberculosis class or dispensary.

Last I wish to speak in regard to a very much neglected educational factor — the influence of the physician himself upon his patients and upon his friends. In spite of the active work being done in Massachusetts, a state which stands foremost in this country in the anti-tuberculosis movement, there are far too many physicians who take no active part in this campaign. In many instances this is due to the burden imposed by an active practice; in many others, however, it is due to the belief that this work is already in the hands of a few physicians who can do it all and who do not need any help. In Boston, for example, it has been only with the greatest difficulty that young physicians have been secured who are willing to give talks to the various labor unions and other organizations which are constantly asking for speakers. Wherever the tuberculosis exhibit is held the work is usually done by one or two active men — the bulk of the profession sits back and waits to see if it is

going to be a success before taking part. The fact that not even 50% of the patients being treated at the Rutland State Sanatorium, an institution which was primarily for incipient cases, are of the incipient class, demonstrates only too clearly the need of education in the medical profession as to what constitutes an early diagnosis. The truth of the statement that "successful treatment ends where physical signs begin" is far too little recognized. Physicians are waiting month after month for tubercle bacilli to appear in the sputum before they tell their patients that they have consumption. In many communities it seems as if the average private citizen were more familiar with the general subject of tuberculosis and its prevention than the medical profession; it is undoubtedly true that the active workers in many tuberculosis associations are not physicians but lay men and women. The physician as an educational factor in this campaign in Massachusetts is not what he should be; we must realize that education is needed among ourselves as well as by the general public.

The final point which I should like to bring out is this, that whichever of these educational methods any community takes up, whether it be by giving a series of lectures, or pay envelope cards, or school tuberculosis exhibits, or what not, the work cannot be well done and cannot accomplish what it should unless it is backed up and made effective by the efforts of a tuberculosis nurse or social worker. This is the real key to successful education in this anti-tuberculosis campaign.

DISCUSSION.

Dr. Eugene A. Darling.—I have not much to add to what Dr. Hawes has already said. I think in Cambridge our experiences bear out to a very large extent what he has outlined. We have tried all the methods he has mentioned, and we find that his concluding remark is true,

that there is a very distinct difference between the kind of work which can be done by the true social worker and the nurse. The nurse gives her chief attention to the sick patient, dealing with her comfort. On the other hand, the social worker takes a much broader view of the case. A variety of problems are presented to her that she is competent to handle because of her experience. We find that the nurse, as a rule, is not able to handle the larger problems, and yet she can do the actual individual work even better than the social worker. In Cambridge the work goes on much better if the social worker does not have to think of the nursing and on the other hand, the nurse does her work better if she does not have to think of the social part of the work.

In Cambridge, whatever work has been accomplished by the Society is very largely due to the fact that we have a very competent social worker who has given a great deal of her time to the work. Our Association has worked in cooperation with the Visiting Nurses' Association.

The other point I wish to mention is the work in the public schools. Cambridge has made an effort to have the law of 1908 put into operation there. We felt the law was worth trying and a committee from the Association held several conferences with the Superintendent of Schools and as a result the following method was adopted of putting the law into operation. It was found that it was better to have the teaching done by the teachers, and yet most of the teachers were unable to give any competent instruction upon this subject of tuberculosis, and therefore it was thought best to have several conferences between a physician and the teachers. It was thought that the same instruction would not be desirable for scholars in all the grades. The teachers were divided into three groups. The first group comprised the kindergarten and the primary schools, the second group the grammar schools, and the third group the high schools, and when it became my task to think up what to say to these three group of teachers, I was very hard put. It was a task of great difficulty indeed, and I do not feel quite satisfied with the result of my effort, but at any rate, we did carry out that plan. I advised the teachers of the kindergarten and primary schools to say very little about tuberculosis itself, but to lay great stress upon the hygiene, clean-

liness, ventilation, exercise and general topics of that kind, keeping the subject of tuberculosis largely in the background, because the children of that age were not able to understand very much about tuberculosis. I advised the teachers of the grammar schools to give their chief attention to the general topics of hygiene, sanitation, and then to give some general instruction about tuberculosis, talking about the great extent of the disease and in a general way the measures which are employed to combat it. I advised the teachers of the high schools to speak upon the subject of personal hygiene to a greater extent and to apply such methods as was necessary to the subject of tuberculosis. I used the pamphlets established by the State Board of Education, and we used Dr. Clark's book, a very useful book for purposes like that.

I had a chance to test whether the scholars grasped the subject or not by the fact that a friend of mine had a boy in one of the lower grades. My friend said that her boy had come home shortly after one of these meetings full of the subject of tuberculosis. She questioned him a little, and I asked her what he said, and she repeated what was really a very good description of the subject, that the boy had grasped. If the children get as good an idea as that we think the work is well worth trying. We all know that what the teacher says carries the greatest weight. Teachers are ahead of parents. What they say goes, and the children will remember it. It remains to be seen whether the plan will be successful to repeat in future years.

One teacher said he was trying to do as little of this and keep within the law, as possible. He said, "I do not believe in talking about these things to children because it is a disagreeable subject." I was a little hot in my reply to him. I said, "It is disagreeable because you make it so. It is not more so than a great many other things we have to approach if done in the right way. We must go about it in the right way." He admitted that perhaps that was so. He said he would try to do more in the future.

Dr. J. F. A. Adams, of Pittsfield: The Berkshire committee has spent its chief efforts in organizing local anti-tuberculosis associations. We have one in Pittsfield, one in Great Barrington and one in Adams. They are all do-

ing good work. Each has a visiting nurse. There is also a visiting nurse in Williamstown.

The school children are being instructed. A little girl who is a member of my daughter's Sunday School class came to supper at my house last week just after the traveling Exhibit of the Boston Association had been in Pittsfield. She began to talk about the exhibit which she had been to see, and I found she was very well informed about tuberculosis. I asked her where she had learned this. She said from one of her school books which she would bring around and show me. She did so, and I found it a delightful little book called "Town and City," with twenty pages on tuberculosis and its prevention. She was in the sixth grade.

Education of adults is less satisfactory. I was told recently of a man who had been at Rutland for some months, and had been discharged, with the disease not arrested. When somebody spoke to him about his careless spitting, he remarked, "I know all about it, and I am going to spit where I've a mind to."

There is one thing which has not been spoken of very much, and I would like to say a word as to the education of the medical profession. There is not sufficient enthusiasm in the medical profession in this work against tuberculosis. A few of the doctors are very much interested and others are not. I do not know exactly why. What is it? You can all form your own conclusions. It requires a great deal of care and attention with little or no return, and a busy doctor finds it hard to investigate every case that comes to his office, and a great many cases of slight cough are called "bronchitis" and treated casually. The patient goes away and comes back perhaps in two or three weeks. It is not easy for the doctor to investigate carefully and thoroughly every slight case of cough. His waiting room is full of patients and he has perhaps fifteen minutes for each. These patients ought to have half to three quarters of an hour. I cannot emphasize too much the importance of this extra care.

There is one way of getting at the doctors. I am one of the committee for preparing questions for the examinations of candidates for membership in the Massachusetts Medical Society, and two of the questions at the last examination were these:—

"1. Diagnosis and treatment in a case of incipient pulmonary tuberculosis.

2. Care necessary in the same stage—(a) for the patient: (b) for the public."

It would be well if some similar question were always included.

Dr. Thomas F. Harrington, of Boston: In addition to the educational methods suggested by Dr. Hawes, the Boston School Department has inaugurated a plan of instruction which promises much.

The pupils in the Normal School are given definite instruction relative to tuberculosis, its cause and prevention, and an outline of instruction has been presented to those pupils, which has for its basis the presentation of the fundamentals underlying the whole anti-tuberculosis work.

One of the most effective means of impressing upon the teachers and pupils the importance of caring for health has been the establishment of "Health Day." On this day all the grades present programmes dealing with tuberculosis and other diseases. The children present essays on the importance of fresh air, cleanliness, exercise and rest, food and drink, etc. The exercises in the schools on this day are arranged so that in each grade lessons are given "why" the windows are opened, exercise taken, positions in standing and in sitting corrected, etc.

In December, 1909, over 90,000 children were examined by the school nurses, teachers, and medical inspectors and over 5000 were judged by the medical inspectors to be anæmic, glandular, under-sized, or choreic. Special open-air rooms have been provided for this class of children and opportunity is given for procuring, at a cost not exceeding two cents, a suitable lunch each day.

The School Committee has placed scales and measuring rods in each district, and the school nurses have been instructed to keep weekly records of the weight of each child. These children are not tuberculous children, but rather the predisposed.

For the purely tuberculous children, a special school has been maintained at Franklin Park. Since the opening of the school in 1908, 196 children, ranging in ages from five to sixteen years, have been admitted. Forty-three of these

children have been returned to their regular grades cured, and many have been promoted into higher grades while attending this open-air school. Each "cured case" is followed up by the school nurse, and each is examined in the Burroughs Place clinic once a month.

In addition to these special classes, the School Committee has changed its rules and regulations so that each schoolroom, dressing-room, and corridor is flushed twice during each session with air from outside the building. All the windows are thrown widely open. A fixed standard temperature of 67 degrees F. has been established for the schoolrooms.

The investigation in Boston would seem to indicate that demonstrable tuberculosis is comparatively rare among school children. From three to five per cent., however, of all school children can be classified as pre-tubercular. The open air rooms established by the School Committee are for this latter class, many of which would gravitate into the tuberculous class unless saved. It seems far wiser in presenting preventive measures to teachers and pupils to avoid, as far as possible, emphasizing any particular disease, such as tuberculosis, and to make the lessons general so as to apply to general health.

Dr. W. W. Marvel of Fall River:—I would say that we in Fall River have used practically all the methods outlined in Dr. Hawes' paper. We have had exhibits and given lectures. The large exhibit was valuable in bringing the crusade before the whole people and now we do more detail work with small groups. Our experiences with lectures have been rather disappointing as we have found difficulty in getting audiences. We reached a number of people by addressing the various trades unions, and to reach the largest number of the poor, we arranged several popular illustrated lectures, the audiences ranging from four to four hundred on Tuberculosis Sunday.

However, our most effective work has been with the travelling School Exhibit. We realized that the subject should be presented in an interesting, instructive and simple way; so we covered practically the whole scheme of general hygiene in as nice and cheerful a manner as possible. The hearty co-operation of the Superintendent of Schools, Mr.

Durfee, was secured and he saw to it that the exhibit was placed in every school building. The corridors were used and the exhibit remained a week in each place. The way the teachers took up the proposition to help their teaching of Hygiene was surprising. There were assemblies of scholars addressed by physicians and prominent citizens and special instruction by the teachers themselves. The children returned and told what they had learned and in the higher grades essays and papers were prepared. I have brought along a few samples of this work and you will agree with me that the results certainly justify the work. What a child has taken the trouble to look up and write about is very apt to remain with him throughout life. This is from a child in the fifth grade :—

"A careful person will never spit carlessly. Spitting causes consumption. A careful boy will never sneeze at the table, when he feels it coming on he should have his handkerchief ready. No one should exchange chewing gum because he not only gets the gum but he gets some of the saliva too, and he also gets the germs, if there are any. He should never take a bite of anybody else's apples or other food."

Here are some more :—

"Last week we had the tuberculosis exhibit at our school and it was very interesting. I think we should learn many lessons from it. From the charts I learned 'How to make your Home, your School, and your City the cleanest, most healthful and best in the United States.'

"We have a fresh air room in my school, and I am in that room. In other rooms I have been sickly and had headaches, and made a large number of absent marks.

"But this year it is quite a change, the fresh air is fine. I have not been absent this year for myself. Our teacher, Miss Leat, knows what is good for us. She has made a healthy girl out of me.

"'The only consumptive to be afraid of is the careless consumptive. He coughs and spits anywhere and everywhere.'

"Take the doctor's advice and 'Don't sleep where there is no *Fresh Air*. Don't work where there is no *Fresh Air*. Sunlight and *Fresh Air* kill the germs.'

"It is dangerous to drink out of public fountains, if you

ever want a drink carry your own drinking cup or drinking glass with you. If you see any rubbish around your home, school or anywhere do not wait for somebody else to pick it up, do it yourself. 'Never spit on the floors in the home, workshop, store or mill, the Dust from dried Sputum spreads disease.'

"I think it was very nice for the Fall River Tuberculosis Society to send around to the Schools the Tuberculosis Exhibit. I learned a great many things from it that I never knew before. I hope others have learned something too."

Those are all from the Fifth Grade. They are all learning the same thing. Other children have brought out their artistic instinct and cut pictures from papers and post cards. Here is a picture of a young baby (holding up a paper) who is going to combat the disease with dumb bells. Here is one from Grade four (holding up paper). This child is probably seven or eight years of age.

One pupil says :—

"Mr. McCreery is telling all the rooms in our school about consumption. Every room from No. 1 to No. 18 is going into the hall to see the exhibit. It was sent by the Anti-Tuberculosis Society. This Society is doing everything it can to prevent consumption. We learned about this society when we came into School last September. One day Miss Flanagan told us a story about a pretty little girl with golden hair who died of consumption. At Christmas time when we brought money for our party every boy and girl in the room gave a cent to help the consumptives. Now we are going to help this Society and help ourselves. We must try to prevent the spread of consumption. First we are going to be clean all the time. Take a bath every night, wash and brush our teeth, and brush our hair. Then we are going to keep our yards clean, and sleep with our windows open. We will try to keep the flies off food, and never bite from anything, candy or apple that belongs to another."

Here is another one, probably the child of a doctor :—

"If you have consumption do not pay any attention to the advertisements in the paper but go to a doctor, and you will be cured. Do not go too late. Go just as soon as you are not feeling well. If you cannot be cured at home you can go to the tuberculosis home. Out there there are tents

a few feet from the ground so that the person who is in bed will not find it too damp for him. Sleep from eight to ten hours. When you get up do not be afraid to go out in the open air, because that will cure you, and then rest. Eat proper food; no pie or cake. Drink all the milk you desire to, and a piece of beef steak is good nourishing food."

Now another school has presented this (holding up a number of letters) in book form, and the children went at this scientifically. Those children have written directly from what they saw at the exhibit, but these other children, seven, eight and nine years of age, have gone down to the library and this is the result. They were investigators. They have drawn pictures of the tubercle bacillus. Our exhibit is almost absurd because it is so simple. I have brought along a few photographs of our exhibit. It did not cost over fifty dollars. It has a box that holds the slides and a strong standard and some steel rods on which are hung these placards.

Dr. Walter G. Phippen, of Salem: We have used all of the various educational methods that have been described by Dr. Hawes with varying results. Of course the exhibit was the first one we used, and it served its purpose well. The press we have used very largely, and, in one way not spoken of here, a method used by the Board of Health, the so-called Health Question Box. Each edition of the paper had a column devoted to questions about tuberculosis or about health in general, and in the next edition of the paper these questions were answered by the physician. I think that helped considerably.

We have not used lectures very much because the greater part of our population we want to reach are Poles, Armenians and French Canadians who do not understand English.

I wish to reiterate what has already been said, that a trained social worker and a trained nurse are very essential. We have only recently been able to have both. We have now a trained hospital nurse. A great deal of attention is being given to keeping in touch with the children in families where tuberculosis has been known to have been previously, and in seeing that they are properly educated. We have a conference with the local board of health which has brought about very good results already, and we are trying to bring about many more.

There is one branch of educational methods which has not been spoken of this morning, and that is educating the people not to have an excessive fear of tuberculosis patients. That fact has recently been brought to my attention because a landlord has requested a tuberculosis patient whom we have had under our control for three years, to move because the other tenents in the house have complained. I think there is a field for a great deal of work. It seems that a large number of patients who do not have tuberculosis definitely, but would be classed as susceptible, and whom the physician thinks needs to take regular treatment, the open air, fresh air treatment, do not like to do it. They say, "I have not tuberculosis. If I sleep at night in a tent people will say I have tuberculosis." It is the fear of such a patient as that that we want to combat.

Dr. L. M. Palmer, of South Framingham: The only help that I think I can bring to this discussion is to speak of the work that we are doing in Framingham. I think that the plan we have in our town, a town of some thirteen or fourteen thousand, will illustrate what can be done. We have one organization with a big name to it which includes a District Nurses' Association and a department for anti-tuberculosis work. We have three departments of that Society with a board of seven directors for each department, making twenty-one in all, and those twenty-one meet monthly and compare notes, and in this way the work of one department overlaps another, and so we keep in touch with all. One person does practically the work of the three departments. She takes the place of a social worker and a nurse, which has been objected to here by one of the speakers as one and the same thing. She makes a daily visit to these cases of tuberculosis in the acute form or has the nurse under her care do it, or in case the patient is not sick enough to see so often, at longer intervals. She also provides for daily care for the sick through the district nurse, a plan that works very well indeed.

Reference was made to the Dennison factory. I want to add my commendation of that work. It is a work that is bound to increase. The amount of good that one social worker who is also a nurse can do to a great manufacturing plant like that is excellent, especially if she is tactful. The

operators like her and go to her for things that they would not go to anyone else for. She does a great deal of good. I think the growth of the industrial nurse is going to be very rapid in the next few years.

I want to emphasize what has also been spoken of before this morning, the fear of the people of the tuberculosis cases. I think there is a danger about over educating the public along this line. We make them afraid. I think this is a point that we must look out for. However, this is not, to my mind, the greatest trouble. My greatest trouble is to convince them that they have got tuberculosis. Up to the present time I do not know what to do with cases that say they have not got it, will not be looked after, will not give up the positions which they are holding. In the case of a table girl, have we the authority to subject this class of people to treatment, and can we put the law to them and restrain them? I am uncertain about it. I shall be glad of instructions.

DR. A. T. CABOT. I will say in answer to Dr. Palmer's question that the State Board of Health has authority if they have a desire to exercise it.

DR. PALMER. How will they do it?

DR. A. T. CABOT. By the laws that they have.

DR. E. ST. J. JOHNSON, of New Bedford: Having listened with much interest to the various speakers, I would say for my own part in the discussion, that the work accomplished by our own state and its various cities would count a great deal more and be much less expensive if certain problems entirely beyond local control could be thoroughly understood and taken up by the Federal Government. These problems and the education against tuberculosis naturally vary, as Dr. Hawes has said, in different places, and I mention those which are more prominent in a city like New Bedford which, as most of you know, is largely made up of cotton mills run by foreign labor. In New Bedford a number of people are making a determined fight against this disease, which was exceedingly prevalent among the poorer classes when this crusade began in the state. This crusade has been, and is at present being waged by the following organizations; first, the anti-tuberculosis society; second, a local sanitarium, The Rockdale Hospital, which

is soon to be moved to more commodious quarters. It takes all cases which cannot be treated at home. Third, the so-called chest clinic. This organization keeps track of ambulatory cases and improved cases returned to work. Fourth, the district nurses' staff, which reports any cases and brings cases to the clinic. There are eleven registered cases so far as we can trace them. By this means education is being placed, and we are striving to seek the best available methods of cure. Good results have been obtained, but we intend to have better ones in the future. The State is helping us a great deal, and methods of increasing such results may perhaps be considered under the following headings: first, instruction of immigrants before they start out. They should be made familiar with the conditions here, and what they must do to favor the conditions of health when they come into the country. The Federal Government has looked after Cubans in Cuba and Filipinos in the Philippines. Why cannot its representatives tell these people the truth about conditions here. Second, the registration of cases by doctors is very important. There should be a fine placed upon those who fail to report investigated cases. A fine for a non-registration of a case of tuberculosis is an important question. These cases cost the state, unless seen early, perhaps four dollars a week for life. Is this economy? Third, the Local Board of Health, I hope some day the membership of this body may be made by state appointment and that it will have at least one well educated, independent physician among its members. Fourth, extravagance. In our city all classes are given over to a most reckless, senseless and spendthrift use of money on things which are not essential to the best methods of health. Fifth, social service work in connection with our clinics, paid if possible, composed of enthusiastic workers, medical and social, to follow up the cases, and to see that they are examined, and to constantly repeat doctrines of common sense living, with assistance where necessary from the churches and charities to carry this out. Each patient should have at least one volunteer worker especially interested in his or her case, who holds the patient to the required standards by constantly repeating the principles of hygiene day after day, week after week, and year after year. I must say the available people in our city are painfully few, and that such work is handi-

capped by personal rivalry, politics, individual misunderstanding and race prejudices so common to human nature in all ages.

We have not made use in New Bedford of the maps, the school-nurses, the out-door schools, or the small exhibits. I hope we shall later. We are going to try.

Dr. E. O. Otis, of Boston: It seems evident from all that has been said here and from the present stage of the tuberculosis campaign that from this time on the educational propaganda must be largely carried on through the schools. In this state especially does this seem to be true; for we, in the Boston Tuberculosis Association, have found that there is no longer a demand for the traveling tuberculosis exhibition, and it has been retired. Coming as a delegate from the Boston Tuberculosis Association I wish to refer to an interesting and unexpectedly disappointing experiment the Association has been making the past year, namely: that of a night camp. In an open space of thirty-five acres in the suburbs of the city, at Mattapan, a very comfortable night camp was erected with twelve bedrooms or separate sleeping apartments, open in front, somewhat after the plan of the "lean-to." This camp was within a five cent fare from the city, and was intended for cured and arrested cases who had returned to their work in the city. Breakfast and dinner or an evening meal were furnished besides lodging, and for this a charge of $6.00 per week was made. We of the Association, as well as Dr. Hills, the superintendent of Rutland, thought there would be no difficulty in filling our twelve rooms with returned Rutland cases or other arrested cases who desired to continue the hygienic and open-air treatment which had been so effective in the cure. To our disappointment, however, we never have been able to fill our rooms although we have advertised the camp extensively, particularly with all Boston patients discharged from Rutland. Whether they have grown tired of institution life or any suggestion of it, or for some other reason, the fact remains that up to the present time the experiment has been rather disappointing.

Something has been said here regarding the obligation laid upon the physician in the tuberculosis warfare and education of the public, and it has been intimated that he has

not always fulfilled this obligation. Of course it goes without saying that it is incumbent upon the physician to do everything in his power towards the prevention of this great plague. I must confess, however, that I have much sympathy for the hard-worked and poorly paid general practitioner. It seems to me that either one of two things will have to take place in the future. Either have a free tuberculosis dispensary for the examination of suspected cases, whether able to pay or not, maintained by the state, municipality or town, and pay the attending physician a reasonable recompense. Or else confine the attendance at such a dispensary strictly to those unable to pay for services, referring those able to pay something to the physician at his office. Tuberculosis work both in prevention and education is for the benefit of the whole community, and the community should bear their share of the expense and not put an undue proportion of such work and expense upon the poor physician, who, as a rule, I believe is always ready to contribute his fair share of service for the public good. Even in tuberculosis dispensaries for the poor alone I believe the physician should receive some recompense—as is the case in the Out-Patient Department of the Boston Consumptives Hospital.

Dr. J. J. Minot, of Boston: I think the important thing in the future is the education of the child and the use of the nurse and the social worker, and I think that these schools are a great service in educating the public and in educating the children. I think that there are more tuberculous children in Boston than is generally thought. There has been no trouble in curing the ones at Franklin Park. If anybody wants to see the school it is open all day from eight in the morning until four-thirty in the afternoon except Sundays, and visitors are welcome.

Dr. Hawes: I have nothing further to say except that the summing up of the whole thing is the handling of the children in the future and getting more and more nurses and social workers, and that when we get requests for information as to how best to spend a certain amount of money that has been given to the Society, the question of paying a nurse and paying her well to handle the problem in conjunction with the physician should be carefully considered.

ARTICLE XLV.

THE SURGICAL TREATMENT OF EXOPHTHALMIC GOITRE.

By CHARLES A. PORTER, M.D.
OF BOSTON.

READ JUNE 7, 1910.

THE SURGICAL TREATMENT OF EXOPHTHALMIC GOITRE.

When I agreed to read a paper upon the surgical treatment of exophthalmic goitre before this section, I had no idea that such excellent résumés of the whole subject were so soon to appear in our Medical Journal, written by Dr. Channing Frothingham, Jr., and Dr. J. G. Mumford. The subject, however, is one of growing importance, and no harm will be done by bringing it up again; perhaps from a slightly different point of view.

While in this community the disease is commonly regarded as a medical affection to be treated along the lines which Dr. Jackson will discuss fully in another section, the advances made by surgery in the past ten years have established without question the superior advantage of operation in properly selected cases. In spite of the newer treatment by sera and other therapeutic measures, a definite proportion of these cases go on to a rapidly fatal issue, or to myocardial and vascular changes which after a longer or shorter time are followed by death. Acute Graves' Disease passes unrecognized even now, and a mortality of 5% to 10%, in the hyperacute cases 15% to 20%, should teach us that exophthalmic goitre may be far different from the disabling, chronic, but perhaps ultimately curable disease which many think it.

The excellent results of Kocher, Charles Mayo, Crile, Klemm, etc., show an operative mortality which varies from 3.5% (Kocher) to 9% in a series of 888 cases gathered from various clinics by Krecke in 1909. Statistics as to

the results in the way of cures are numerous and somewhat variable. Heineck claims as end results 63.7% cures in 207 cases. Mumford's analysis of 741 cases, chosen somewhat at random, from different surgeons' statistics gives an immediate mortality of 4.03%; late mortality .66%; unimproved .38%; improved 22.27%; cured 70.3%. Though these figures are interesting and any argument in favor of operative treatment as against medical treatment halts lamely when not backed up by figures, I must confess to an entire agreement with Dr. George Grile, who states his opinion as follows:

> "A study of my series of 72 operations for Graves' Disease presenting as they do numerous and complex symptoms, and involving many organs, as well as the most fundamental vital processes, impresses me with the great, almost insurmountable difficulty; I may add, the impossibility, of compiling any statistical table that accurately represents the net clinical results."

The disease itself is fatal in perhaps 10% of the cases. Most surgeons select their material for operation and many cases of temporary hyperthyroidism must be classed in the statistics as cases of Graves' Disease. What the physician wishes to know is the particular risk which an individual case runs from operation, and what are the chances of cure as compared with medical treatment. This I claim must depend upon the sound judgment and skill of the surgeon, and the stage of the disease, and cannot be estimated from statistics in per cents. In the same way in regard to cures, when once certain degenerations have developed, a cure by medical or surgical means becomes an impossibility; some cases with very acute symptoms rapidly improve with or without operation; other patients, apparently well after a couple of years, whether operated upon or not, have a recurrence of the disease. Many consider themselves, indeed

appear well, and might be called cured, yet careful examination after unusual mental or physical stress shows undoubted evidence that the disease was slumbering and not cured. In estimating the probable chances of a favorable outcome, the result is peculiarly dependent upon the possibility of the patient living an after-life free from care.

In spite of all the work that has been done upon the pathological histology of the thyroid gland, there is much to be learned about the abnormal physiology in Graves' Disease. Gradually the older theories that exophthalmic goitre was due to intestinal toxemia or a sympathetic neurosis are giving way to the probability that the thyroid, for unknown reasons, functionates excessively, or that certain products which are there destroyed in normal individuals, escape and cause a general toxemia. Kocher speaks of the disease as a thyro-toxicosis; Mayo as hyperthyroidism. Whatever be the real explanation, the results of experimental work, and operation have shown conclusively that the abnormal thyroid has to do with the symptoms in question, either primarily or secondarily, and that modification of its circulation or partial removal, influence favorably the course of the disease. According to some pathologists, notably Louis Wilson of Rochester, there is a certain parallelism between the symptomatology and pathology; others have not confirmed this view. Hyperplasia of some part of the gland is however rarely absent when symptoms are present, though the lightning response to psychic stimuli bears evidence that the toxemia is due to a chemical poison rapidly formed and excreted in excess.

The aim of medical treatment, absolute rest, ice bags, bromides, bromide of quinine, digitalis, etc., is to keep the patient alive until the abnormal stimulus has ceased to act, the poisons are eliminated or neutralized by antibodies, and then so to regulate the life of the individual that storms will not return. With rodagen, thyrodectine, etc., and the se-

rum treatment of Rogers and Beebe, the object is to neutralize the toxins, and in cases of hypothyroidism when combined with Graves' Disease, to give both thyroid juice and antitoxic serum in proper proportions. The X-rays are advocated by those who believe that the gland can be atrophied and the efferent lymph channels narrowed or obliterated. Certain forms of electricity, according to reports, have proved beneficial, but it is probable that their action is in part due to suggestion combined with other hygienic measures. If a tumor is present which stimulates adjacent thyroid tissue, the surgeon, by operation removes the exciting cause of the symptoms. By ligature of vessels, he brings about diminished blood supply and lessened activity. If veins and lymphatics are obliterated by ligature or postoperative scar tissue, the channels of absorption are interfered with. Finally, by partial thyroidectomy, he directly attacks the source of supply.

In my opinion, too little distinction has been made between the purposes sought by operation for fibroids or appendicitis and that sought in operation for Graves' Disease. In the first instances, the surgeon may really cure the disease by radical removal; in the latter, all that is actually attempted is *to modify the functions* of *an over-active gland*. After all the ligature operations and even partial thyroidectomy, enough thyroid tissue is left behind, which if it hypertrophies or the patient is subjected to the same influences which brought about the original disease, may again become overactive and cause a recurrence of symptoms. If this conception of Graves' Disease be a correct one, the physician or surgeon must be careful in promising permanent cures, and he need not be surprised, if examination is made with sufficient care, to find that many cures should be more properly ranked as permanent improvements. If the patient survives partial thyroidectomy, it is obvious that there will be less risk of recurrence than if the patient is treated med-

ically, for there is less thyroid tissue by which toxins may be produced. On the other hand, as a proportion of these cases, through involution, go on to thyroid sclerosis or colloid degeneration, the danger of the development of post-operative myxœdema must be considered if too much thyroid tissue is removed by surgery. In 1908, Klemm reported the results of operations upon 32 cases, most of them having been followed for several years. There were no deaths. Twenty-seven were heard from; 92% recoveries; 4% improvements; 4% failures. He advises operation as soon as the diagnosis is made. In spite of these good results, few surgeons agree with such a radical point of view, for it is now the belief that a preliminary course of medical treatment should be carried out for a varying period before operation should be considered. When symptoms of hyperthyroidism occur engrafted upon a chronic goitre, operation is usually indicated for several reasons; because of the danger of malignancy, estimated at 7% to 10% when goitres after 35, suddenly enlarge; secondly because medical measures are usually unsatisfactory when the thyroid tissue is stimulated by an abnormal growth, and finally, because the results of such operations are extremely good and relatively free from danger. To this class belong many patients operated upon in the great clinics and classified as secondary hyperthyroidism. These show temporary symptoms with periods of comparative health, and particularly if operated upon in the interval, the mortality is very low. I have myself operated in over twenty cases without a death. The dangers are those of any serious operation requiring skill; hemorrhage, sepsis, injury to the recurrent laryngeals, possibly tetany if much of both lobes have to be removed—with injury to the parathyroids. The real question as to medical or surgical treatment arises in true cases of hyperplastic goitre without marked enlargement, but presenting all grades of hyperthyroidism or thyroid toxemia.

In these cases, the operative and post-operative mortality is considerable and very difficult to determine from the statistics at hand, for no proper distinction is made between these two classes of cases and the relatively small mortality of the former when classed with the latter diminishes unduly the mortality of true exophthalmic goitre. I have operated upon only eight real cases of exophthalmic goitre with one death one hour after operation. Here the surgeon is confronted with the risks of hyperthyroidism developing usually soon after or within forty-eight hours of the operation for which careful technique does not appear to be a preventative. Such an experienced surgeon as Charles Mayo reports 2% of deaths following simple ligature of vessels. In most of my cases, convalescence has been rather stormy; for a few days fever, varying between 101° and 103°, rapid, bounding pulse, dyspnœa, etc., but in none of them, with the exception of the fatal case, did the condition cause any anxiety. Of the seven cases surviving the operation, six have been markedly improved; none have been cured. In the seventh, marked exophthalmos with conjunctivitis and rapid pulse led to immediate operation to prevent corneal ulceration. Owing to the carelessness of the etherizer, the eyes at first covered by vaseline and protective tissue were exposed for an hour to ether vapor and a most severe inflammation developed. The operation, hemithyroidectomy, was satisfactory, the patient leaving the table in good condition. There were well marked symptoms of toxemia for two days after the operation, which were followed by such a severe ocular infection that the patient had to be transferred to the Eye and Ear Infirmary. Pain was extreme, the patient became delirious, and at the end of three weeks death seemed imminent. Upon withdrawal of the atropin, however, the low, muttering delirium with rapid pulse disappeared, the eyes slowly cleared up, and the patient is now convalescent in spite of complications which were peculiarly unfortunate after an operation for Graves' Disease.

Another case, a chauffeur of 30, had suffered for a year from typical symptoms, which during the past two months, in spite of good medical treatment, were rapidly getting worse. I saw him with Dr. Proctor of Sandwich, Sept. 8, 1909. At this time he was very nervous; tremor; bounding pulse of 140 which shook the chair in which he sat. Under absolute rest in bed and bromide of quinine for three weeks, he improved somewhat; the severe attacks of palpitation ceased; the pulse varied between 98 and 110, but he did not gain in weight. On Oct. 2, 1909, the right half of the gland was removed and the superior thyroid vessels tied on the left. For several days there was fever and tachycardia, but the patient expressed himself as feeling distinctly better, less nervous and no palpitation. Thirty-five days after operation, the patient had gained 15 pounds, was still improving, but the pulse varied between 94 and 104. The left lobe has undergone some compensatory hypertrophy. Mar. 9, 1910, five months after operation, patient within 4 pounds of his regular weight; pulse averages between 80 and 90; in my office 116. When quiet feels perfectly well, but under excitement or after walking fast, heart begins to beat rapidly. Patient has been under bromide of quinine since operation. Further operation was advised, and on Mar. 19, 1910, the upper half of the left lobe was removed. More severe reaction after removal of half of this lobe than previous removal of half the gland. Discharged on the 13th day. Two weeks later pulse was 74 in the morning and 88 in evening; has entirely lost his nervous feelings, but has not yet recovered his strength. In this case, owing to inadequate removal of tissue at the first operation, a second one was necessary.

Case III. Man of 28; 6 months' ago, after business stress, extreme nervousness, insomnia and loss of weight. Treated for nervous prostration, and sent to the woods. Two months later, goitre developed with tachycardia and

loss of 50 pounds. Patient had collapse on way to office. Examination showed typical and excessive thyroid toxemia; pulse was 165 to 170; marked tremor of fingers; some exophthalmos; patient could not sit still a second; profuse perspiration; cardiac enlargement; very vascular goitre with loud bruit. After three weeks of absolute rest in bed with ice bags, bromide of quinine, etc., the general restlessness improved, the pulse fell to 110, but loss of weight continued. On Aug. 24, 1909, I removed the right half of the gland under ether. After operation, the pulse rose to 150 and temperature to 102.5°, but on the 6th day the temperature was normal and the pulse had fallen to 100. Patient was infinitely less nervous, and could rest calmly quiet in bed; his weight fell to 115. Yesterday, nine months after operation, he reported again. He has been at work as business manager for three months; considers himself well, but gets tired at night. He has a ravenous appetite, and has gained 45 pounds. There is no exophthalmos; pulse is 72 and regular; apex normal. Is this patient cured? Certainly not yet, for the tremor remains; he is still 20 pounds under his normal weight, and has not recovered his full strength. He has refused to give up work, and has neglected medical treatment for six months. While 9 months of good medical treatment might have brought about equal improvement, he failed under the most favorable surroundings to gain weight until operation was performed. The contrast between his condition yesterday and ten months ago is most striking.

Case IV. Surgeon Von Mikulicz. Woman of 21; entered the Massachusetts General Hospital in April, 1902. Two and a half years previous became nervous and excitable, palpitation, profuse sweating, and right eye was prominent. Two years ago goitre developed with dyspnœa on exertion. At entrance pulse was 156; cardiac enlargement; fine tremor of hands; marked pigmentation of skin.

Under neutral bromide of quinine and rest in bed, patient improved, and was discharged in 6 weeks feeling much better. A year later, in May, 1903, in spite of continuous treatment with bromide of quinine, patient re-entered hospital in about the same condition as at first: profuse sweating, insomnia, extreme nervousness, but pulse was only 124. Operation by Professor Von Mikulicz. Upper part of left lobe removed; superior and inferior arteries tied on the right. Stormy convalescence with very high pulse and temperature. Two weeks later, however, patient feels much better; eyes less prominent, pulse regular, rate 120. Three years later recurrence of symptoms; half of right lobe removed; again much improved by operation, but at the present time, in spite of more or less continuous medical treatment, the left lobe has hypertrophied, and the patient still presents some symptoms of the disease.

Turning for a moment to the medical statistics, we find reports in 1908 by Jackson and Mead of 85 cases, treated with Forcheimer's neutral bromide of quinine. Of these 85 cases, 29 reported by letter; 56 were personally examined. Of the 29 cases, 20 regarded themselves as well, 7 were unimproved and 2 were dead. Of the 56 examined, 42 showed no obvious signs of the disease after two years, 7 were improved, 6 unimproved. Sixty-nine per cent. of the 29 cases considered themselves well; 75% of the 56 cases appeared well at the time of examination. Under 2% died. These are most excellent results, but it must be remembered that these patients were almost all ambulatory cases.

In December, 1909, Rogers and Beebe reported the results of their specific serum treatment in 480 cases of all stages of Graves' disease. Fifteen per cent. cured; 10% no subjective symptoms; 50% improved, that is, after a few months of treatment, patients disappeared; 17% unimproved; 8% dead. These results are by no means as fa-

vorable as Jackson's treatment with bromide of quinine, but the mortality suggests a severer grade of the disease, and some patients with early acute toxemia showed marked improvement, which had not taken place under the usual treatment.

How shall the physician decide which cases shall be treated medically and which subjected to operation? In this borderland disease, close co-operation between the physician and surgeon is necessary to accomplish the best results. Medical treatment should always be tried first, its duration to depend upon the degree of improvement and upon the circumstances of the patient as regards ability to rest. In the poorer classes, operation, in spite of its dangers, should be done earlier, as it offers hope of quicker improvement. When tumors are present in the gland, operation should be done early in a quiescent period. Relapsing cases should probably be operated upon; if each succeeding relapse leaves the patient at a lower level, surgery is indicated before chronic myocardial and vascular degenerations make the case incurable. Severe chronic exophthalmos is an indication for operation. In very acute Graves' Disease, after the usual treatment, Rogers' serum, if obtainable, should be used. If no improvement takes place shortly, a minor operation under cocaine with ligature of arteries or veins should be done in the majority of cases. If the patient survives the operation, some of the most brilliant surgical results follow in these cases. In estimating the risk of operation, it must be remembered that in these hyperacute cases conservative treatment gives its greatest mortality.

In spite of Kocher's extensive experience and low mortality, 3.5%, most of the operations being done under cocaine anæsthesia, the majority of surgeons have come to prefer general anæsthesia with ether.

Crile is convinced that the psychic factor, the dread of operation, is in a great measure responsible for post-opera-

tive hyperthyroidism. This may explain the deaths following minor operations, such as ligature of the vessels. Whether it is necessary to keep the patient in ignorance of the operation for several days, and then after narcotics to operate practically without the patient's knowledge, is open to question. No such measures are taken at the Mayo clinic, where the mortality is as low as 4%.

I regard one to three weeks of absolute rest in bed, with appropriate treatment, as the most important preliminary to operation in these cases, and so far as possible, the psychic element must be considered. In planning the amount to be done at operation, the surgeon must remember that he is attempting to modify the function of an over-active gland; that several operations may be necessary; that it is far safer to do too little than too much. Simple ligature of the vessels, arteries, veins, or both, is often all that is necessary in some of the milder cases, and is all that the hyperacute cases will usually bear. Ligature of one or both superior thyroids is quicker and easier than the inferior thyroids. The ligature, always of silk, must be placed close to the capsule of the gland, in order to avoid the blood supply of the parathyroid bodies. If the patient improves after this preliminary operation, partial thyroidectomy may be undertaken with increased safety at a later period.

In discussing the technique of operation I shall mention only a few points. The reversed Trendelenberg position markedly diminishes venous bleeding. The transverse low necklace incision gives adequate exposure and leaves a minimum scar. The anterior muscles should be divided at a different level and carefully sutured at the end of the operation. The gland should be handled with extreme gentleness; one is surprised at the thinness of its proper capsule, which should be brushed back by dry sponging, carrying with it the parathyroid glands, which are rarely seen. In primary Graves' Disease the gland is extremely vascular.

Great care must be taken to avoid hemorrhage, and hemostasis must be absolute. More reaction usually follows removal of half of one lobe than half of the gland, due probably to the crushed thyroid tissue left behind. It has seemed to me to be of advantage, after hemithyroidectomy, to tie the superior vessels on the other side. The wound should always be drained by a stab below the original incision, which should be entirely closed. The scar is slight and inconspicuous. After operation, salt solution should be freely given by the different methods, in an attempt to diminish post-operative hyperthyroidism. Hoarseness often persists for sometime; occasionally it is permanent, but is then usually due to an injury of the recurrent laryngeal nerve. If only one side is paralyzed, a relatively good voice is usually acquired.

In spite of the relatively small mortality, as gathered from the larger statistics of Kocher, Mayo and others, I cannot but consider the operation for acute Graves' Disease a dangerous one, only to be undertaken by a skillful surgeon. It is of great importance that proper medical treatment be continued for a long time after operation; in fact, it seems to me that the benefits of surgery are often lost from the belief of the patient, partly fostered by the attitude of the surgeon, that operation alone will cure Graves' Disease.

Finally, in conclusion, it seems to me that it is of utmost importance that the physician recognize that surgery, in properly selected cases, offers more and quicker improvement than medical treatment. To be successful, earlier operation must become the rule, before incurable degenerations have developed. When reasonable medical treatment has been carried out, the surgeon should be consulted. While from the very nature of the disease *permanent cures* may not be common, *permanent improvements* follow timely and appropriate operation in the large majority of cases, after medical treatment has proved unavailing.

DISCUSSION.

Dr. J. M. Jackson, of Boston: I have to speak just for a few minutes on some indications for operation in exophthalmic goitre, a little more fully perhaps than Dr. Porter reported to you. In following perhaps 250 cases of exophthalmic goitre, I feel that one of the most important indications is the loss in the condition of the myocardium. All these cases if allowed to go on sufficiently long, sooner or later must develop a certain amount, more or less, of myocarditis. Now if we are going to cure these patients we must get at them before that condition of the myocardium comes on. That is why I feel that we ought to call in the surgeon earlier than we have hitherto. Although I recognize perfectly well that from twenty-five to fifty per cent. of cases get well without treatment, or with very simple treatment, at the same time I think we give our patients the best chance if we take them before it develops into weakness of the heart wall itself. Moreover, if we find when a patient comes to us that she has already a myocarditis she should be operated on at once. I mean by that, if she shows any irregularity of pulse either of rate or rhythm, or if we find any enlargement or dilatation of the heart—those cases should be done at once. Of course, I do not feel that we can cure all those cases; because once a myocarditis is established the chances are that it cannot be checked; but operation does prolong life and helps the general condition. So that I do not feel the complication of heart trouble to be an argument against operation.

There is a class of cases I have been interested in of late: Several times I have seen these patients and could not account for the symptoms—dyspnœa and bronchitis with wheezing and discomfort in breathing. Examination of the throat showed no signs whatever of enlargement of the thyroid, and yet with the X-ray and by percussion I have found a thyroid running well down into the chest, and at operation have seen a thyroid as large as my fist which was being dug out from below the clavicle. These must occasion a good many of the cases of sudden death. I have seen three cases already where the patients died suddenly—there was an enlargement of the thyroid which had not been recognized.

Then one more point in connection with the thymus. The persistent thymus gland is supposed to be a complication of operation, but although I have seen several cases in which the thymus gland was present and have advised against operation, I am inclined now to feel I would do better to advise operation in those cases, because it is impossible for us to say whether the case is one of persistent thymus or whether it is a normal thymus and a bunch of fat; and I feel very strongly they had better take their chances of sudden death and have the operation than to go on and have the same advanced symptoms of exophthalmic goitre. I feel that the combined effort of surgical and medical men is nowhere so important as in these cases of exophthalmic goitre. It is not a medical disease nor a surgical disease, but a combined disease. I think the sooner we get together on it and work this out the better statistics we shall have. I do not feel that our statistics thus far amount to anything. We say "a patient is cured." We ought to say, "cured to date," because we do not know when any one may relapse. I have seen a case for fifteen years absolutely free from symptoms which has today developed an acute exophthalmic goitre. So we shall have to change our nomenclature, and if we say "cured," will say "cured to date."

Dr. J. C. Munro, of Boston: It pleases me to hear Dr. Jackson advise that surgical and medical men get together on these cases. We must get together. There are a certain number of cases easily cured by medical treatment, and also a certain proportion easily cured by surgery, and some the surgical and medical men have got to work out together. Personally I still feel afraid of exophthalmic goitre; our cases have been advanced cases —I seem to feel we have not had enough experience yet or worked enough with medical men to know which cases will stand operation and which will not.

Dr. F. B. Lund, of Boston; I would like to emphasize one or two points in Dr. Porter's paper. One is the fact that from the multifarious character of the disease and the various degenerations and connections it has made statistics are very hard to establish. I have had a certain small ex-

perience in operating and my cases have all been light ones, and I don't think there is much danger of their getting to the surgeon without a good deal of medical treatment. It requires much judgment to tell just how much thyroid to take out, or in which cases one ought not to take out any thyroid but ligate the vessels; and I have had admirable results in ligating the vessels. I think Dr. Porter is modest about reporting his case as cured. I think if a case gets so much better as that he reported, I should say he was perfectly well. Of course, you cannot make a man younger by any operation.

I think these patients have been neglected, misunderstood; it is a class of patients with which we are going to accomplish a great deal.

ARTICLE XLVI.

SOME OBSERVATIONS ON THE SURGERY OF THE VASCULAR SYSTEM.

By JOSHUA C. HUBBARD, M.D.
OF BOSTON.

READ JUNE 7, 1910.

SOME OBSERVATIONS ON THE SURGERY OF THE VASCULAR SYSTEM.

ARTERIOVENOUS ANASTOMOSIS FOR GANGRENE.

WHAT treatment is offered at present to the patient who seeks advice for senile gangrene? Amputation so high above the gangrenous area, even though it be small, that the patient is shocked at its extent, and the surgeon dreads the crippling effect of the operation for his patient, appreciating but too well that he is too old to become at all skilful with the use of crutches or an artificial leg. What is to be said to the younger men with pre-senile gangrene? Much the same. The amputation must be equally high though its effects may be less crippling, as the patient is young enough to learn how to get about by artificial means.

How attractive would be an operation which would offer to the patient improvement in the circulation sufficient to prevent the increase of impending gangrene, or to make it safe to remove only the gangrenous area itself, with a fair certainty that the flaps would heal kindly? How eagerly would both patient and surgeon accept such an operation? It is to review the possibilities of such a procedure that this paper is written.

In 1906 Carrel and Guthrie (Annals of Surgery, February, 1906) demonstrated by experiments on dogs that it was possible to divide the femoral artery and vein, and then to anastomose them in such a way that the circulation in the leg would be completely reversed, the vein carrying arterial blood and the artery returning venous blood.

They demonstrated beyond dispute that the technic was surgically possible on animals and that the joints would remain patent. At first thought it would seem that the valves in the veins would offer an obstruction to the reverse flow. They showed, however, that the valves, in a comparatively few moments, yielded before the arterial pressure. Inasmuch as senile gangrene is due to an insufficient amount of blood reaching the part through the arteries, the suggestion was made by them that such an operation might be of benefit to man in the treatment of this condition. Could the blood be side-tracked and delivered to the part through the veins, a greater amount of blood would necessarily reach it, since the capacity of the veins is much greater than that of the arteries.

A knowledge of the pathology of the two conditions, senile and pre-senile gangrene, is necessary for a clear understanding of the mechanics of the operation. For the operation to be beneficial, the deep veins must necessarily be patent.

(Keene's Surgery, Volume I, p. 317). Freeman mentions two theories advanced to explain senile gangrene.

1. Winiwarter believes that senile gangrene is due to a definite form of inflammation of the internal coats of the arteries (endarteritis) which produces narrowing and finally obliteration of the channels by the formation of granulation tissue.

2. More recent studies by Zoege-Manteuffer and Weiss have shown that the principal, if not the sole cause, is sclerosis. This narrows the calibre to a point where thrombosis easily occurs on the roughened surface, thus completing the obstruction. The arterial sclerosis may be either diffuse or nodular, or both together.

Buerger (American Journal of Medical Sciences, 136, p. 567) finds that the obstruction to the flow in pre-senile gangrene, or thrombo angiitis obliterans, comes from the

formation of obturating thrombi which later become organized and canalized. The process is not secondary to the existing gangrene and occurs even when no gangrene is present. He finds that the thrombi may form in the veins as well as in the arteries. (Journal of American Medical Association, 1909, April 24.) In nineteen cases of this condition the arteries were more or less affected. There was obliteration of the deep veins in seven and of a large part of the internal saphenous in one. Because of the extent of the disease, the veins in six offered no better channel for the blood than the arteries. In these six, therefore, arteriovenous anastomosis would have been a useless operation. To determine the patency of the deep veins, he has suggested a simple test. The leg is allowed to hang down a sufficient length of time for a fair degree of cyanosis to appear. The veins are then obliterated by a tourniquet above the knee; the leg is then raised high and the bandage loosened sufficiently to remove pressure from the deep veins. If the cyanosis is slow in disappearing, or fails to disappear, it is a fair conclusion that the deep veins are not functioning.

The inferences to be drawn after this examination has been made are, unfortunately, not infallible. This was shown recently to me in a case seen with Dr. L. E. Somers, of Cambridge. A man of sixty-five, whose right leg had been amputated for senile gangrene, was seen because of discoloration of the left foot. It was evident that gangrene was about to begin in that foot also. An attempt, therefore, seemed justifiable to save the leg. With a tourniquet tight about the thigh, the leg was allowed to hang. The cyanosis of the foot increased within a few minutes. The tourniquet was then loosened sufficiently to control the superficial veins and the leg raised, and the discoloration disappeared. I felt, therefore, that the deep veins were patent. At the operation the femoral vein and the artery were firmly adhe-

rent together. The artery contained a clot, and the lumen of the vein was obliterated by an organizing thrombus, through which small canals ran in an irregular manner. An arteriovenous anastomosis was, of course, out of the question.

In an old man whose gangrene presents the appearance of ordinary senile gangrene, there may be an intermixture of a former condition of thrombo angiitis obliterans with the senile condition. It would be well to try Buerger's test before attempting an arteriovenous anastomosis, but not to put too much importance on the result. Certain cases of gangrene of the lower extremity will, undoubtedly, be found to be unfit for the operation; others will, however, remain where there is no physical contra-indication for carrying out the operation.

When a new surgical cure is under discussion, it must fulfil satisfactorily three tests before its place is assured. 1. It must be demonstrated that the procedure can be carried out on animals. 2. That the surgical technic is possible in man. 3. That the operation when completed is of benefit.

The first requisite has already been fulfilled by the experiments carried out by Carrel and Guthrie, as previously mentioned. It is to be my object to convince you that the second requisite has also been fulfilled by three recent cases. The third requisite must still be left undecided, although it would seem that it were about to be fulfilled. The three cases mentioned above I will now cite in some detail.

Weiting (Deut. Med. Wochensch., July 9, 1908), reports the following case which evidently comes under the classification of thrombo angiitis obliterans. A man forty years old had his right leg amputated a year previous because of spontaneous gangrene in the foot. When he came under observation, the left foot and the ankle were livid and cold to 15 cm. above the malleolus. When the

foot was raised, it became white; shiny edema was present, as well as paresthesia and pain. Under spinal anesthesia the femoral vessels were cut down upon; the vein was tied below the junction of the internal saphenous; the artery was divided above the origin of the profunda; the proximal end of the artery was then intubed into a lateral incision in the vein below the tie and caught in place by sutures. A month and a half after the operation, there was scarcely any difference in appearance between the left foot and a normal foot. It was warm and free from pain. In two months he was discharged from the hospital.

Second case by Hubbard. (Boston Med. and Surg. Jour., Oct. 7, 1909.) A man of 77 years with threatened gangrene of half the foot and much pain in the leg. No pulsations in the vessels. An arteriovenous anastomosis was done under ether. At first the pain was much relieved by the operation, and the color of the foot was decidedly improved. On being allowed to hang the foot down, seven days later, slight edema appeared which gradually increased until the leg became very much swollen and woodeny in feeling. The circulation in the foot continued to improve but the pain was unbearable, and five weeks after the anastomosis the thigh was amputated below the site of the anastomosis. At the amputation arterial blood spurted from the femoral vein.

Third case by Muller (Annals of Surgery, February, 1910). Patient fifty-one years old. When admitted he had gangrene of some of the toes. Under spinal anesthesia an end-to-end anastomosis was carried out by the Carrel method. Complete reversal was not attempted. Following the operation, a line of demarcation developed at the tibio-tarsal joint. About two months later the leg was amputated four inches below the knee. At this time the veins showed feeble but distinct pulsation.

In two of these cases it was demonstrated beyond dispute

that the arteriovenous anastomosis was functioning after five to eight weeks, and in the first case the clinical evidence is such that it must be taken for granted that the joint was patent. The technic of the operation is, therefore, possible.

As to the permanent benefit of the operation, it may be said that Weiting's case had had no further trouble after two months. In my own case, circulation in the foot was, without doubt, better than before the operation. The pain, however, had not evidently been relieved and extreme edema had developed.

According to Freeman, writing in Keene's Surgery, the origin of the pain in gangrene is not clear. Two explanations have been offered; the first, that it is due to degenerative or inflammatory changes in the nerves, and the second, to the reaction of the nerves to acute anæmia. Whether a complete reversal of the circulation would have prevented this, and section of the nerves, as suggested by Bryant and Buck, have relieved the pain, can be learned only by future work. (Bryant and Buck, Vol. 2, American Practice of Surgery.) Stretching the internal and external popliteal nerves has given moderate relief to the pain of gangrene, while resection of 5 cm. of them has arrested pain at once. They now advocate simply severing the nerve. This would relieve the pain and give an opportunity for the nerve to regenerate later.

In presenting the advisability of an arteriovenous anastomosis to a patient who has already a slight spot of gangrene, it is fair to state definitely that the operation has no shock; that it is possible, under proper technic, to make a tight joint; that there is a chance of much benefit resulting from the operation; that if it fails he is no worse off than before as to the height of the amputation above the gangrenous area. I am not prepared yet to suggest it to the patient who has no real gangrene present, except under the most

extraordinary circumstances, as under those present in the case of Weiting.

DIRECT TRANSFUSION OF BLOOD.

I will turn now to the other branch of vascular surgery in which I, personally, have had experience, namely, direct transfusion of blood. It is to Crile that we owe the successful carrying out of the technic of direct transfusion of blood, and it is from his work and enthusiasm that the procedure has taken a very definite place among the various methods of treatment. There is no question of its efficacy in certain conditions. In other conditions its effects are still under judgment, and in still others it is of no benefit.

Since Crile has described his canula, various men have modified or altered it entirely with the idea of simplifying the procedure. There are now many canulæ on the market, and various methods of performing the operation have been described. It seems to me there are several requisites. In the first place, the canula must be made in several sizes or be adaptable to any size, for it must fit the vessel of the new-born baby as well as that of the adult man. The technic of putting it in place must be as simple as possible, and the means by which it is fastened in place must be sufficiently strong to withstand an occasional pull, as during the half hour or so the blood is running from the donor to the patient it is impossible at times to prevent a certain amount of pull on the joint. Carrel simply sutures one vessel to the other, but this, with the ordinary surgeon, is entirely out of the question. He is not sufficiently skillful to carry out the technic; therefore, some mechanical aid in the operation is necessary.

Various modifications of Crile's canula and technic (Annals of Surgery, September, 1907) have been made by Ottenberg (Annals of Surgery, 1908, Vol. 47, p. 486), Levin (Annals of Surgery, 1909, Vol. 49, p. 320), Vickery (United States Medical Bulletin, 1908), Elsberg

(Journal of American Medical Association, March 13, 1909), Bernheim (Annals of Surgery, October, 1909), Hepburn (Annals of Surgery, January, 1907), Brewer, Hartwell, and, doubtless, others. Personally, I have finally given up all technics except that described by Elsberg, and my advice to one who wishes to make himself proficient in the technic of direct transfusion of blood is for him to experiment with the various canulæ which appeal to him, and then to finally settle on one and learn how to use it. The technic of direct blood transfusion is very fussy at times. There is no reason why anyone who is willing to do a few experiments should not learn how to use a canula, though at times it tries the patience of everyone before the operation is finished. I should like to lay stress on the importance of not delaying before attempting this method of treatment so long that the patient is really past recovery. The technic, as I have said, is, at times, difficult, and it may be an hour or two before the blood is flowing properly. It has been my misfortune to have patients die while I was at work and before the transfusion had been completed.

Hæmolysis is held up as a danger in direct blood transfusion. It is defined by Crile as a toxic condition, which gains its name from the fact that the red corpuscles are destroyed to a more or less extent. It is thus a toxæmia from the transfused serum.

In the ordinary emergency case, where blood transfusion is indicated as a life-saving means, there is no time for carrying out a test for hæmolysis, and in my experience I have been fortunate enough to have seen no accidents from the mixing of bloods. I doubt very much whether the test is necessary in cases of hemorrhage of any character or shock. When the question of improving the condition of one who has been sick for some time to such a point that he may be operated on, then there comes the possibility of the hæmolysis, in which case a test should be made. Pepper and

Nisbet (Journal of the American Medical Association, August 3, 1907) refer to a case of hæmolysis where the condition appeared after a second transfusion from a second donor. I have transfused a patient a second time, three days later, from a second donor, a cousin of the first donor and a sister to the patient, with no ill effects.

After the canula is in place, I have found it difficult at times to determine whether the blood was flowing, and have made several mistakes, I feel sure, by being too impatient to obtain results, and have cut out the canula and done the operation over again. I now feel that if one is sure of his technic it is much better to leave the canula alone and wait for from fifteen to twenty minutes before considering the operation a failure and doing it over again. Such a length of time sometimes is necessary to show the first change in the patient. With the first suggestion of restlessness or sighing on the part of the donor, it is well to stop the transfusion, as there then remains but a short time before the donor will feel the effects of the loss of blood.

The dangers of direct blood transfusion have always seemed to me to be more to the donor than to the recipient, because of the dissection of the radial artery close to the numerous flexor tendons of the wrist. It is exceedingly difficult not to break asepsis when it is time to connect the vessels of the two persons. Should the donor's wrist become septic, one can imagine the disastrous result to the usefulness of his hand. I have always picked out the left hand in those who were right-handed, and so far have had no mishaps.

It has not been my good fortune to carry out a blood transfusion for all the conditions for which it is recommended. There is, however, no doubt, as I have said before, but that in traumatic or post-operative hemorrhage or shock, it is a life-saving method. I will mention the following case simply as an example:

I first saw the patient eight hours after operation. (Vickery, United States Medical Bulletin, 1908.) A laparotomy had been done for removal of the spleen. When I saw him his pulse was imperceptible at the wrist, 160 at the heart; his body was cold and exsanguinated; his respirations 40 and shallow, and he had not recovered consciousness since the operation. After the transfusion his pulse dropped to 108 and became full and strong at the wrist; his respiration dropped to 18 and became full and deep; his lips and skin became pink and he recovered consciousness, began to laugh and talk, and complained of the pain of the needles in suturing the wound in his arm, whereas before a dissection of his vein had been done without any cocain and without causing pain.

With toxæmia, such as eclampsia, transfusion seems, in certain cases, to be of benefit. Without doubt there are various types of eclampsia (*i. e.*, pregnancy, convulsions, kidney irritation). As yet we do not know enough about these different types to know which it will benefit and which not. Crile reports in his book the recovery of two cases of eclampsia following transfusion, to which I can add another.

(Boston Medical and Surgical Journal, February 17, 1909.) Primipara. 40 years old. A few days before the date of expected confinement patient had a convulsion with other symptoms of eclampsia. She was immediately delivered. The urine from a catheter specimen contained a large amount of albumin, much abnormal blood and many casts. In spite of treatment for the first twelve hours after operation the patient's condition remained practically unchanged, remaining dull and apathetic and passing no urine. A catheter passed thirteen hours after delivery found the bladder empty. It was at this time that I saw the patient. After consultation, and at the suggestion of Dr. Patterson, a transfusion was done. At the end of the trans-

fusion the patient was conscious and clear mentally. Six hours after the transfusion the patient began to pass urine spontaneously and passed 90 ounces in the next twenty-four hours, and the bowels began to move for the first time since delivery. On the second day patient passed 160 ounces of urine, which showed no blood and only an occasional cast. The convalescence from this time on went along satisfactorily until recovery.

A second case of a very different type was a failure. Convulsions developed on the second day after delivery. The urine was secreted in fair amount and contained a good trace of albumin. The patient had numerous convulsions and became distended. Various methods of treatment were tried and finally a transfusion was done. As a result the patient became much more quiet, her pulse improved, and gas began to pass by rectum. The patient improved for a while and then began to lose ground, in spite of the fact that the kidneys and bowels were functioning. She was, however, still irrational and unable to see. Finally, just before death, she was transfused a second time without any benefit. She died several hours later.

Direct transfusion has been recommended in the treatment of hemorrhage of a hemophiliac to increase the coagulability of the blood, and cases have been reported as cured. Unfortunately, the intervals between the attacks of bleeding may be so long that the treatment is declared to be curative, whereas there has simply not been time for a second hemorrhage. Such a case I saw last fall with Dr. W. D. Small—a young girl who with her periods almost bled to death. Her history had been gone into carefully, and the case was considered one of hemophilia. Finally, after various methods of treatment had been tried, she was transfused, about a year before I saw her. The surgeon reported the case as cured by transfusion. Later, however, she began to bleed again freely with menstruation. When I saw her

she was exsanguinated from the loss of blood, and within comparatively few days bled to death, her parents objecting to any further surgical intervention.

In another case, recently seen with Dr. H. L. Smith, in a woman who was considered a hemophiliac, a secondary hemorrhage followed an operation on the nose of sufficient amount to cause fainting. Transfusion had, apparently, no effect on the coagulability of the blood, for a few hours later the bleeding from the nose recurred. Ligature of the common carotid was finally resorted to to control the hemorrhage.

A very similar case is reported by Lambert (Annals of Surgery, April, 1910, p. 575). A child was admitted to the hospital bleeding from a tonsillectomy done on the previous day. She soon collapsed from loss of blood. Her pulse became imperceptible and she lost consciousness. At this time she was transfused. At the end of the operation she was in excellent condition, with a pulse of 124. She was perfectly conscious and all hemorrhage had ceased. About four hours later there was a profuse hemorrhage, lasting for some twenty minutes, which was followed by a continuous flow of bright blood. Her pulse again became rapid and small. There was no bleeding point which could be seen in the bed of the tonsil. The left external carotid artery was then ligated and the bleeding entirely controlled.

In hemorrhagic disease of the new born, it appears that a large proportion of the babies can be saved. The technic in them, however, is exceedingly difficult, because of the size of the vessels. Such cases, however, are most satisfactory. The following case was seen with Dr. F. S. Newell and Dr. J. L. Morse:

About twenty-eight hours after birth the baby began to vomit and spit up blood and to pass blood by rectum. A diagnosis of hemorrhagic disease of the new born was made, and a transfusion done several hours later. Following the transfusion there was no further bleeding.

Crile and Lenhart (American Journal of Medical Sciences, October, 1907) recommend transfusion as the best treatment for illuminating gas poisoning. I have had one such case, where the man was brought to the Relief Station. He had been found uuconscious with a tube from a gas pipe in his mouth. The odor of gas had been noticed around the house for several hours. He was unconscious and bright pink. About an hour after he reached the Relief Station he became conscious, but was hysterical and hard to control. Ether was necessary to keep him sufficiently quiet to carry out the technic of the tranfusion. He left the hospital four days after entrance with no abnormal symptoms. Dr. Drown, resident physician at the Relief Station of the Boston City Hospital, who sees many such cases, felt that this man had taken a sufficient amount of gas to cause derangement of various organs within a few days. He felt that such a case would eventually die. Personally, I have not had sufficient experience with such cases to know.

In closing these few scattering remarks about direct transfusion of blood, it may be fairly said that it is now a recognized method of treatment in hemorrhage and shock, and in hemorrhagic disease of the new born; that it is perhaps of benefit in some cases of eclampsia and illuminating gas poisoning, and perhaps in hemophilia and as a means of improving the condition of a feeble patient to such a point that an operation may be undertaken.

DISCUSSION.

Dr. Lewis M. Palmer, of South Framingham: Mr. Chairman, I would like to ask the reader what governs him as to the quantity of blood taken from one to the other in transfusion. I think it is very hard to determine how much blood it is wise to take in a given case.

Dr. Hubbard: I think it is very hard to determine how much is taken from the donor. The blood is usually

allowed to run until the patient is sufficiently improved, or until the donor begins to show signs of feeling faint. The exact quantity I cannot tell you.

Dr. F. B. Lund, of Boston: In one experience I found very serious symptoms on the part of the donor after running the blood for three quarters of an hour. It was run that length of time because the vessels seemed quite small and we did not think we were getting very much. The symptoms that occurred were that the donor drew one long breath, his jaw dropped, and he went through all the motions of dying, but rapidly recovered on elevating the feet.

I have been limited in doing transfusions by the fear of doing them in cases of hopeless cancer. One owes some responsibility to the donor. And I do not like to transfuse a patient before an exploratory operation on the abdomen, because I have taken blood from a man to brace up a patient so that he would stand an operation, and found the patient I was operating on had a serious malignant disease; in such a case I feel that I have done the donor a wrong. Under such circumstanses my procedure has been to do an exploratory operation first and find out whether the case is malignant, and then, if necessary for other symptoms, to do a transfusion. Nine times out of ten at exploration you will find that transfusion, if you had done it, would have been unnecessary.

Dr. Hubbard: It is important to emphasize the necessity of watching the condition of the donor during the transfusion. The effect of the loss of blood appears usually suddenly. The first evidence comes from the character of the respiration. Strangely enough, the pulse changes very little until it suddenly becomes very poor. As soon as the donor begins to take an occasional long breath or sigh it is time to stop the flow, for within a few moments, if the flow is allowed to continue, he may become very pale, his pulse of very poor character, and he may faint with relaxation of the sphincters. The condition is very alarming. Fortunately those that I have seen have regained consciousness within a few moments. It may require, however, several days for the donor to regain a normal condition.

ARTICLE XLVII.

ACUTE PANCREATITIS,
WITH THE REPORT OF TWO CASES.

By PHILEMON E. TRUESDALE, M.D.
OF FALL RIVER.

READ JUNE 7, 1910.

ACUTE PANCREATITIS.

WITH THE REPORT OF TWO CASES.

Acute Pancreatitis is an appropriate subject to present for your discussion at this time, for it is about twenty years since the notable contributions of Dr. Reginald H. Fitz[1] marked an epoch in our knowledge of this disease. The Middleton Goldsmith lecture was delivered by him before The New York Pathological Society in 1889. In this essay there was outlined a more definite and precise symptomatology than had hitherto been known. The classification of the disease by Dr. Fitz was based upon a comprehensive study of the terminal pathology, and was fundamental to the intelligent interpretation of diseased processes in the living subject. His accurate deductions are still quoted by the authors of our modern text-books.

At that time the origin of the disease was attributed to the extension of a gastro-duodenal inflammation along the pancreatic duct. Some investigators have maintained the theory of chemical and autodigestive changes. Of these, Truhart[2] reported 74 cases of Acute Pancreatitis, in only 14 of which were micro-organisms demonstrated. That, however, would not eliminate their presence as a cause in a much larger number. The frequent accompaniment of gallstones and their septic influences have been pointed out by Fitz,[3] Opie,[4] Flexner,[5] Robson,[6] and others who have proved the association of these infections from the biliary tract. Opie[7] discovered this relationship at an autopsy of a case operated by Bloodgood. A gallstone, the size of a pea, was found occluding the ampulla of Vater, thus forming a continuous

passage through which the bile travelled from the common duct directly into the pancreatic duct. To this interesting discovery he added seven others, and inferred that in many cases the stone might be temporarily lodged long enough to allow damage to the pancreas and then escape, leaving no other evidence of its presence.

The close anatomical relationship of the pancreatic duct and common bile duct is an important factor in the associated pathology. In a large percentage of cases the opening of the common bile duct is surrounded by pancreatic tissue.

Egdahl,[8] in an analysis of 108 cases, says that about 42% of the cases of Acute Pancreatitis are associated with gallstones, and considers them the most common single cause. Although the consensus of opinion is in favor of infectious agents from the intestinal tube and bile ducts, in 10% of Egdahl's cases the presence of mumps was an associated and causative factor. This is evidence that metastatic infections, either through the blood or lymphatic stream, enter into the etiology.

The hemorrhagic phenomenon which is present in the fulminating cases remains unsolved. When death occurs early the extravasation of blood seems to dominate the whole process. The theory that arteriosclerosis produces this dyscrasia has been disproved. Mr. Robson[6] has suggested that the hemorrhage may depend upon the presence of glycerine. Others have attributed the hemorrhage to the action of the pancreatic juices. Williams[9] found that in Kaiserling preparations from specimens of the acute hemorrhagic pancreas the colors did not materialize and thought possibly that the action of the pancreatic juices had something to do with this result.

When these hemorrhages occur the disintegration of the substance of the gland ensues, and infection promptly converts the process into an acute fulminating inflammation.

The frequency with which the abdomen has been explored in recent years has made possible the recognition of the less fulminating and yet acute inflammations of the pancreas. The presence of fat necrosis is considered the pathognomic sign. This lesion results from the escape of pancreatic ferments into fat tissue, splitting the fats into fatty acid and glycerine. Langerhans first produced this change by injecting into rabbits and dogs an infusion, made by grinding up the pancreas of a freshly killed rabbit with finely splintered glass, and succeeded in producing a small opaque focus at the site of injection which had the histological characters of fat necrosis. He consequently concluded that it was possible to produce fat necrosis by the action of fresh pancreatic juice upon living fat tissue. Balzer,[10] in 1879, first recognized the association of fat necrosis in Acute Pancreatitis.

Opie[11] in his experiments succeeded in reproducing the more widely spread condition of fat necrosis observed in man, and showed that the same cause is responsible for it as for the local lesions. Flexner[12] and Oser[13] found that injections of dilute acids, dilute alkalies, artificial gastric juice, turpentine, or suspensions of bacteria, while causing more or less serious injury to the parenchyma, were liable to be accompanied by necrotic changes in the pancreatic and abdominal fat. Clinically, its recognition is of great importance since its presence in practically all cases is taken to indicate a severe inflammatory lesion of the pancreas. It was formerly interpreted as a fatal sign, but we know to-day that its presence does not necessarily indicate a lethal termination. Truhart disproved the old theory by collecting ten cases in which fat necrosis was present, and yet an immediately fatal issue did not result.

The changes which occur in the gland itself in Acute Hemorrhagic Pancreatitis are usually rapid and destructive, involving the entire parenchyma of the gland. As a result

we have degeneration of the entire glandular elements. The islands of Langerhans are less readily destroyed than the secreting cells of the acini.

The following two cases have occurred in my practice: —

Case I. S. C. Female. Age 53. Single. Seen in consultation with Dr. A. C. Peckham, Dec. 3, 1907. She had always been well except for an attack of acute indigestion in 1904. Since this attack she complained of habitual constipation, but her digestion was not a source of discomfort. Dec. 1, 1907, following a period of constipation of three days duration, she developed severe acute symptoms. Epigastric pain radiating to both sides, vomiting of mucus and bile; the pain with a sensation of fulness in the epigastrium, continued except when temporarily relieved by hypodermic injection of morphia. She was admitted to the hospital on Dec. 4th. Temperature 100, pulse 100. The patient was obese and had a slight degree of jaundice. Her abdomen was distended and tympanitic. There was tenderness over the upper half with spasm of the right rectus muscle. Urine negative. Diagnosis gall stones.

Upon opening the peritoneal cavity through a right rectus incision the omentum was found adherent around the gall bladder and pylorus. The duodenum was engorged. Scattered over the omentum, duodenum, and gall bladder were small round, opaque areas. The gall bladder was distended, thickened, and not collapsible. The head of the pancreas was considerably enlarged. The gall bladder, which contained inspissated bile and a deposit of very fine granular material upon the mucous membrane, was drained. A small piece of omentum and a portion of the fundus of the gall bladder, upon which were several of the small opaque areas, were removed for histologic examination. These showed a leucocyte infiltration surrounding small areas of fat necrosis. The patient recovered.

Case II. My second case was of the acute fulminating type and characterized by the group of symptoms detailed by Dr. Fitz in 1889, "Sudden, severe, often intense epigastric pain without obvious cause, in most cases followed by nausea, vomiting, sensitiveness, and tympanitic swelling of the epigastrium. There is prostration, often extreme, frequent collapse, low fever, and a feeble pulse."

Case II.—Pancreatic Slough. 15 cm.×3 cm. with central duct.

On Oct. 26, 1907, Dr. George G. Parlow was called to see Mrs. L. F., aged 26 yrs. Housewife. Native born. Well up to the time of her marriage, when she complained of a muco-purulent discharge from the vagina, associated with frequent and painful micturition. Jan. 25, 1907, was delivered in normal labor of a poorly developed fœtus at about the eight month of gestation. She developed a bilateral pyosalpinx and pelvic abscess during her convalescense. On March 1, 1907, both fallopian tubes and the left ovary were removed. Drainage was employed for a large ovarian abscess which had ruptured during its enucleation. Discharged from the hospital, March 30th, weight 174 lbs. Her general health improved, and except for obstinate constipation, she was symptomatically well up to the morning of the attack now to be described. Her weight some days before was 230 lbs.

On Oct. 26th, while in her yard, following mild but sudden exertion, she was seized with agonizing pain in the epigastrium. She fell upon the ground and remained there for several minutes, then managed to walk into the house. Hot drinks and hot applications proved ineffectual for relief. She vomited an ordinary basin full of dark fluid material. Dr. Parlow's first observation was made a few hours after the onset of her attack. She was in a state of collapse, with a rapid, feeble pulse and subnormal temperature, perspiring freely, and indicated the epigastrium as the location of her pain. Cardiac stimulants were administered by hypodermic injection, and a gradual recovery ensued. The pain was most severe in the epigastrium and radiated toward the left groin, and was aggravated by turning upon the same side. Tenderness over the abdomen was general. An enema was given without result. The pain was relieved only by hypodermic use of morphia. On the following morning the pulse at 130 had improved in quality. The temperature was 101° F. She described the discomfort in the epigastrium as a feeling of intense weight, unremitting and radiating to the back. There was no vomiting after the first day. An ice-bag upon the abdomen gave the most comfort. On Oct. 30th there was noticed a slight degree of jaundice, the urine was a deep red, and a small stool by enema was of light yellow color. During the next few days she remained in a precarious state, the pulse varying between 120 and

130, the temperature from 99.5° to 102°. Flatulence was a troublesome symptom, and the abdominal discomfort thereby made extreme was relieved by enemas.

On Nov. 4th I saw the patient in consultation with Drs. Parlow and Curry. She complained of a constant dull aching pain across the upper abdomen, with occasional paroxysms induced by the formation of gases in the stomach and intestines. Her face wore an expression of exhaustion and pain. Tongue was dry. Sclera had a yellowish tint. The abdomen was distended, tympanitic, and tender everywhere, especially in the zone above the umbilicus where there was an indurated mass the margin of which could not be well defined. The temperature was 101.5° F., pulse 130, respirations 36. I had palpated her gall bladder at a previous operation and had felt no stones. Acute cholecystitis with perforation and abscess was considered as well as abscess from perforation of the stomach, duodenum, or transverse colon. In view of the absence of earlier symptoms pointing to the biliary or intestinal tract, together with the suddenness and severity of onset, slight jaundice, and the presence of a tumor in the epigastrium plus peritonitis, the diagnosis of acute pancreatitis was ventured. The patient appeared to be on the border line, her condition hardly justifying surgical interference.

White blood count—35,000. Polymorphonuclears 83%, Lymphocytes 11%, Large mono-nuclears 5%, Transitional 1%.

Operation on Nov. 6th at the patient's home. During the previous twenty-four hours there had been eight bowel movements, moderate amount, liquid, and pale in color.

The abdomen was opened in the mid line above the umbilicus. The subcutaneous fat was quite yellow. A sero-sanguineous fluid escaped from the peritoneal cavity. Beneath the parietal and visceral peritoneum were disseminated areas of fat necrosis. These were numerous and conglomerate in the immediate vicinity of the pancreas. The gall bladder was distended. No stones were felt. The pancreas was much enlarged, and presented a dark mottled appearance through the gastro-colic omentum to which it had become attached. An incision was made through the peritoneal cover, and the finger passed into the body of the pancreas, the substance of which was very friable and bled freely. In

spite of the hemorrhage wide deep openings were made into the gland. No pus cavities were opened. Fragments of the necrotic pancreas and the omentum were removed for examination. Tubes of Loeffler's blood serum were inoculated from the necrotic tissue; these remained sterile. Split rubber tubes enclosing gauze were used for drainage and the wound dressed.

The operation was of short duration, and there was no apparent shock. The pathological findings were as follows: —The specimen consists of a small piece of omentum and some separate bits of a very friable hemorrhagic tissue. The specimen from the omentum has several yellowish white, greasy spots, varying in size from $\frac{1}{4}$ – $\frac{1}{2}$ c.m. in diameter.

Microscopical examination.—Sections of the omentum show numerous areas of fat necrosis. Sections from the hemorrhagic tissue show much free blood and cell detritis surrounding definite areas of necrosis. In one spot there is connective tissue, marking off what apparently corresponds to a gland lobule. Within this lobule are the faint outlines of gland acini; some of them are outlined in blood. No living cells, but much nuclear detritus is seen throughout the section.

Diagnosis: —Acute hemorrhagic pancreatitis.

The convalescence was eventful. The temperature and pulse gradually approached normal for the first week. The discharge from the wound was copious, mixed with blood for several days, followed by the thin secretion from the gland, containing pus. This discharge subsequently became very irritating, causing a dermatitis over a large area. A paste of castor oil and bismuth proved to be very effective in relieving the consequent discomfort and limiting the extent of the excoriated surface.

On the 9th, 10th, and 11th days the discharge diminished perceptibly, and the temperature rose to 103°, pulse 140, and respirations 40. The sinus was enlarged by the introduction of the finger, after which free drainage was reestablished. For the subsequent week the patient's condition was not encouraging. There was an irregular elevated temperature with pulse between 130 and 140. On the twentieth day after operation I removed a sloughing mass which presented at the opening of the sinus. It measured 15 c.m. by 3 c.m., and was composed of a mass of necrotic

tissue surrounding a central duct which coursed its entire length. (See Fig., Case II.)

On Nov. 27th patient had a chill, followed by phlebitis in the right leg. Again there followed a wide variation of temperature with rapid pulse. There was but little hope for her recovery at this stage. A culture was taken from the discharging sinus. An autogenous vaccine was prepared by Dr. George P. Sanborn from the growth of colon bacilli. This was administered at first in doses of ten millions on Dec. 7th and 8th, twenty millions on the 10th and 11th, thirty millions on Dec. 14th, 17th, and 21st. There followed a gradual approach to normal of temperature, pulse, and respiration. Sugar had appeared in the urine, but was not estimated quantitatively until Nov. 28th, when there was found 5.2% with the polariscope, and Lohnstein tube specific gravity was 1.026. No albumen. Twenty-four hour amount 90 ounces. On Dec. 2d the amount of sugar diminished to 0.7% by Lohnstein tube. On Dec. 5th 0.43%, and it was found absent for the first time on Dec. 9th by Mylander's solution, and did not reappear. The twenty-four hour amount varied from 72 oz. to 90 oz., and the specific gravity from 1.005 to 1.011. Four ounce starches were added to the diet on Dec. 16th and continued for one week, when a mixed diet was allowed. The stools during this period were normal, well digested, and contained no starches or fats. Fat globules were observed on Nov. 10th and in several liquid discharges on later dates.

On May 2, 1910, this patient was found to be in good general health. Her weight had returned to 205 pounds. She complained of epigastric distress from one to two hours after meals, especially if she had eaten meat and potatoes. Her bowels alternated between constipation and diarrhœa. Examinations of the urine and fæces were made by Dr. Herbert as follows:

Urine—sp. gr, 1.028, acid, no albumen, no sugar with Mylander's reagent. Urea with a Doremus test 0.018. Stools showed undigested muscle fibre. No starches or fats.

June 3d test breakfast was administered, the examination of which showed an entire absence of free and combined hydrochloric acid. Also an absence of chlorides, which would account for undigested muscle fibre.

DIAGNOSIS.

The diagnosis of Acute Pancreatitis usually is made after exploratory incision. The cases of moderate severity are the most difficult to recognize. Frequently associated with an acute cholecystitis or cholangitis, it remains difficult to determine the source from which the symptoms originate. In Case I, the pain was at first located in the epigastrium, later becoming general, with occasional paroxysms, and it returned after the influence of the morphia had worn off. With the appearance of jaundice these cases simulate a suppurative cholangitis. The head of the pancreas is early involved, and, although the pain is referred to the epigastrium, it radiates over the abdomen rather than to the subscapular region. Tenderness and muscular spasm are usually more pronounced in the right upper quadrant. In the presence of such symptoms pancreatic infection can only be suspected.

The Cammidge[14] reaction which was first described in 1904 has received recognition as a diagnostic test by many writers, including Robson,[15] Moynihan,[16] Ochsner,[17] and others. In the application of this test one should be reasonably skeptical. It is quite likely to be found positive when so desired, and vice versa.

In sixty-two cases of pancreatitis, Pilcher[18] of Rochester, Minn., found the urinary reaction positive in 82%. Positive reactions were obtained in all the so-called subacute cases. He concludes that a typically positive reaction with a negative control is almost pathognomonic of pancreatitis.

The errors in Pilcher's investigations were pointed out by Dr. Wilson,[19] pathologist at the same hospital, in a paper read at the Triennial Congress at Washington, one month ago. His tests were carried out by taking the urine from patients whose histories were not sent to the laboratory. He obtained the reaction in cases which were not found at

operation to have pancreatitis, and he failed to obtain the reaction in others in which the presence of the disease was demonstrated at operation.

He went further and obtained a positive reaction in the urine of young healthy adults temporarily overfed. Dr. Wilson therefore concluded that the presence of this reaction was related to the changes of metabolism, and that its value as a diagnostic agent in pancreatitis was open to doubt.

The acute hemorrhagic cases are confounded at first with intestinal obstruction, and perforating ulcer of the stomach or intestine, phlegmenous cholecystitis or ruptured gall bladder and ptomaine poisoning. Although intestinal obstruction does occur at the same time, it is limited to that portion above the jejunum. The patient may pass flatus with repeated enemas. The distention is less marked in pancreatitis than in intestinal obstruction. Vomiting in the latter condition is persistent, while in acute pancreatitis it may subside early. In cases of a perforating ulcer an ulcer history may be obtained. If ruptured gall bladder is suspected, previous evidence of trouble may be found. In ptomaine poisoning there is diarrhœa from the beginning.

In Acute Pancreatitis the onset of the attack which may follow a period of constipation is sudden, severe, and frequently followed by collapse. Vomiting occurs early. If death does not supervene, the process becomes circumscribed, jaundice appears, the stools become bulky and contain fat. Ochsner[20] and Opie[21] have observed cyanosis as a symptom.

Elliot[22] mentions the fact that in Acute Pancreatitis a tympanitic note on percussion is obtained over the tumor by the location of the gland behind the duodenum and pyloric end of the stomach. The pancreas may become so large, however, as to appear in contact with the anterior abdominal wall and collapse the duodenum.

TREATMENT.

There are mild cases which undoubtedly clear up without treatment. When the disease is of moderate severity and associated with cholecystitis and cholangitis, drainage of the bile passages is indicated.

In acute hemorrhagic pancreatitis the situation differs somewhat from that found at the beginning of an acute fulminating process in the appendix, gall bladder, or pelvis. In the latter diseases operation in the first twenty-four hours usually finds the patient in as favorable a condition as he will be, while in acute hemorrhagic pancreatitis the degree of shock which accompanies the onset of the disease must be added to the risk of surgery.

Mayo Robson[23] advocates operation before the period of collapse has passed off, since he says that this may be dependent upon septic absorption.

Mikulicz[24] believes that we should not in general allow the severe symptoms to pass and delay the operation until the formation of an abscess. Nevertheless, of the cases which he collected only 9 out of 46 operated upon in the acute stage recovered, while 18 out of 35 recovered when the operation was performed in the later stage. However, he points out the unsatisfactory side to such statistics, inasmuch as most cases were operated upon under mistaken diagnosis of perforative peritonitis or intestinal obstruction, and the abdomen thoroughly explored for the suspected perforation or occlusion. The post-mortem examination in these cases first demonstrated the true condition. It is obvious that such "irrationally conducted" proceedings in the presence of an already existing condition of shock must result in a high mortality.

It is probable that many of the surgical deaths incurred by operations undertaken in the first twenty-four hours would be medical deaths if let alone, yet an operation if not carefully and expeditiously executed can, at the outset, remove

the only chance a patient may have for recovery. Every death from Acute Pancreatitis in the first twenty-four hours is not necessarily from surgical neglect.

When an acute process assumes a severe hemorrhagic character, as the result of a dyscrasia similar to that which occurs in a pure pancreatic apoplexy, but little hope can be entertained from operative interference. A patient presenting the symptoms of shock at the onset of this disease, when the diagnosis can be made, should be treated by the use of hot saline infusions first and surgery later. When a differential diagnosis cannot be made, and the degree of shock is not too severe, immediate exploratory laparotomy would seem to be indicated. Whether the condition disclosed is a perforation of the stomach, intestine, or gall bladder, or an acute pancreatitis, a short, well-executed operation will offer the most hope.

Dr. Fitz,[25] in his original monograph, dismissed the treatment in the following paragraph: "It is evident that all treatment at the outset can be nothing but palliative. With the formation of pus in the omental cavity comes the opportunity for the surgeon. The possibility of the successful removal of the pancreas is suggested by the healthy condition of the patient seventeen years after he had discharged this organ from his bowels." This is the attitude of many conservative surgeons of to-day.

The second case reported above is an example of many others in literature showing the tendency of the destructive process to become circumscribed, and the resistance which may be manifested in a case the onset of which was quite severe.

The operation upon this patient, although performed at a much later date in the course of the disease than would ordinarily be selected, probably presented a more favorable outlook than if it had been done in the first twenty-four hours.

Nevertheless, appreciating the danger of gangrene, the formation of a phlegmon in the loose tissues of the retro-peritoneal region rich in lymphatics, and of general sepsis, one would not wisely delay operation after the pulse had recovered a good quality.

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DISCUSSION.

Dr. David D. Scannell, of Boston: — I think I can best crystallize my remarks on the subject by presenting a case of acute hemorrhagic pancreatitis actually operated on July 1, 1909 (the patient is present in person).

George F. S., 55. Wood-turner. Boston City Hospital, July 1, 1909. Family history negative. Previous history also negative from the point of view of symptoms referable to the condition for which he was operated.

Present illness: — Three days ago, patient was seized with acute stabbing pains in his upper abdomen; to use his own expression, "he retired in apparently good health at 9.30 P.M. and awoke at 11.30 P.M. with sharp pains like knife thrusts through the stomach, followed by vomiting until 7.45 the next morning. No symptoms of collapse. These pains were associated with more or less gradual distention of the abdomen and marked constipation. After twenty-four hours the vomiting ceased, and patient found his greatest discomfort in dull epigastric pain and the abdominal distention. After twenty-four hours in bed, the patient took a train to Boston, a six hours' journey, sitting up the whole distance in an ordinary passenger car during the whole of this journey. His suffering was intense, and his color and expression so bad that he was a source of much anxiety to his fellow-passengers. From the time of his arrival in Boston until his admission to the Boston City Hospital (seventy-two hours from the beginning of the attack), his abdominal distress was intense.

Physical examination at the time of entrance.—Patient in a state of collapse and suffering intensely; face pinched, slightly cyanotic and anxious; nose cold; tongue heavily coated; slight jaundice in both sclera, though no cutaneous jaundice could be made out; pulse 128 and of wretched quality; temperature 99.8°.

Abdomen markedly distended and spastic throughout, the greatest spasm being in the upper half of the abdomen and here most marked just to the right of the middle line. While tender all over, the abdomen was most tender in the epigastrium and right hypochondrium; the distention and spasm making definite palpation quite out of the question. There was dulness in both flanks and tympany above; rectal examination was negative.

Diagnosis. The history and the physical examination seemed to make the diagnosis of acute hemorrhagic pancreatitis the most probable one, though an acute gall-bladder, with or without perforation, or a perforated gastric or duodenal ulcer, were kept in mind.

Operation. High right rectus incision; immediately on opening the abdominal cavity, a moderate amount of serosanguinolent fluid escaped; the intestines were everywhere distended; there was no evidence of fat necrosis. Directly under the incision, and occupying the anatomical site of the head of the pancreas, was a mass of adhesions, roughly comparable to the size of a clenched fist; this mass continued to extend across the abdomen, about the direction of the pancreas, though less large than under the wound. Before exploring this mass, the stomach was inspected and showed no perforation; the duodenum was covered over by the mass, and, therefore, was not to be scrutinized; the gall-bladder was moderately distended, but to quick palpation presented no abnormality; no stones were to be felt; the general peritoneal cavity was walled off with strips of gauze and the mass explored with the finger; immediately there set up a most brisk hemorrhage, coming from no particular vessel, but from the whole mass; the finger, without difficulty, went down through the swollen area to what was unquestionably the head of the pancreas; the patient's condition, wretched to start with, became distinctly and acutely worse, and it was deemed wisest to terminate operative procedure as rapidly as might be; gauze packing in considerable amounts was pushed down to virtually the patient's back bone, and the hemorrhage fairly controlled. In view of a possible association of a chronic gall-bladder as the cause of the pancreatic lesion, it seemed wisest to drain the gall-bladder, which was rapidly and easily done, rubber drainage being used. The abdominal wound was closed for the most part, and shock treatment and slow saline by rectum were instituted.

Recovery was astonishingly rapid. The original packing was removed gradually, so that it was entirely out by the fifth or sixth day. There was almost immediately evidence of slight digestion of the wound from the escape of pancreatic juice. The gall-bladder drained efficiently, and all drains were out on about the twelfth day. After the oper-

ation, practically no pain whatever was complained of. Three weeks from the day of operation the patient was discharged well.

Four weeks later, the patient was re-admitted, with severe pain in his right hypochondrium over the site of the incision, associated with nausea and vomiting. At this time, physical examination showed extreme tenderness over the old scar and a localized swelling about the site of his gall-bladder. Under ether, the previous scar was opened up with an escape of about one-half pint of thin bile. This was drained, and the patient did well for fifteen days, during which interval he drained bile freely. His general condition steadily became worse with a complete loss of appetite and a distinct loss in weight. During the latter period of this interval, more or less definite pain was complained of below and to the right of the umbilicus, with the development at this site of definite spasm, tenderness, and swelling. A third operation was done and a large amount of straw-colored, flaky fluid evacuated; there was no frank pus. The omentum and serous covering of intestines showed evidences of fat necrosis. Drainage was established, and for some days little hope was entertained of the man's recovery. For three weeks after this last operation, the discharge from both incisions was most free. At the end of that time, the discharge stopped, and the patient rapidly regained his health, and within a month of the last operation was discharged well. Since that time, there has been a steady and progressive gain in every respect, with entire absence of digestive disturbances, increase of weight and general betterment.

Dr. Torr Wagner Harmer, of Boston: I was interested to hear what Dr. Truesdale said of the Cammidge reaction. I think, if any one has worked conscientiously with this test in the laboratory with a clinical knowledge of the cases, he can spell out in a very few words "the Cammidge reaction is dead." It is not a specific test for pancreatic disease. Dr. Boos and I have been interested in working on this subject, and have performed a large number of tests. We have been careful to exclude any material containing sugars, and with but a few exceptions have selected only those cases in which pancreatic involvement

seemed unlikely. Every case with a white count over 17,000 showed a positive Cammidge reaction, regardless of the clinical condition, and regardless of the type of leucocytosis, neutrophilic, basophilic, or myelocytic. We obtained autopsies of four cases, and in each the pancreas was normal. Again last year Dr. Boos obtained a negative test in a case of Dr. Balch's with acute pancreatitis. You will find a number of instances reported in the literature (Bushnell, Gruner, Schroeder, Ransohoff, Kinnicutt, Lyle) in which the test was negative and the pancreas diseased.

Dr. Daniel Fiske Jones, of Boston: In regard to diagnosis, I do not hear much said about the differential diagnosis between pancreatitis and intestinal obstruction. The first lot of cases I saw were all diagnosed as acute intestinal obstruction. This mistake is not so frequently made at present. Then in regard to operation, it seems to me it ought to be emphasized a little more that practically the only possible treatment for these cases is early operation—and by operation I do not mean simply an exploratory laparotomy, but a thorough opening up of the capsule of the pancreas itself. This area should be packed with gauze to prevent escape of pancreatic secretion into the general abdominal cavity, and to give drainage. The operation to be of value must be early, and the gland freely opened up to relieve tension before extensive destruction of the gland takes place.

Dr. J. C. Munro, of Boston: There are one or two points which I should think should be emphasized. It is possible to get well without opening up the pancreas. I have seen a number of such cases both at the hospital and one or two in my own private practice where simply opening the abdomen apparently cured the patient. There is no doubt that in the acute cases there is nothing but surgery that ought to be considered. I have operated on a dozen or more, and don't think that in most of them the question of intestinal obstruction came in at all. The thing that has aided me in clearing up a diagnosis of a case before operation is the presence of a high pulse and a rather low temperature, the fact that the pain is intense, the fact that all

these patients have a slight jaundice which is not the jaundice of gallstones but is the jaundice that goes with the pancreatic infection of the gall bladder.

We see it in cases of acute pancreatitis. In the first three or four hours the pain and spasm is all in the upper part of the abdomen. It is, I think, rather characteristic. I think the outlook is not so black as the books would have us believe if these cases are operated on before the patients are *in extremis*. I think that drainage of the pancreas is sufficient; and where there is not acute hemorrhage we do not use much gauze packing; we use just a strip or two.

Dr. F. B. Lund, of Boston: Some years ago I reported six cases of this disease, and in these cases, as in my subsequent experience, I have been much impressed with the difficulty of making a diagnosis between acute pancreatitis and perforation of the stomach or gall bladder. The rise of temperature, tenderness, spasm and absence of constipation have served to render a diagnosis of intestinal obstruction improbable. The picture of acute pancreatitis is very much like the picture of acute perforations, especially of the gall bladder, for the reason that they are usually preceded by a history of gallstones. The percentage of cures, owing to the position of the pancreas, virulence of the infection and the difficulties of drainage, will always be great, but without drainage and judicious drainage all the cases of gangrenous pancreatitis certainly must die. It is astonishing how much of the pancreas can slough, and at the same time leave behind enough pancreatic tissue to take care of the digestion of the individual. In a case of mine which was ill for a long time and finally died, an autopsy was made. After the sloughing of several large pieces of pancreatic tissue, nearly a normal amount of pancreas appeared to be left behind. Of course it is possible that part of what we considered pancreatic tissue was really the peripancreatic fat. Localized abscesses or necroses of the pancreas naturally give better results under drainage than general hemorrhagic pancreatitis.

ARTICLE XLVIII.

THE PLASTIC SURGERY OF THE OVARIES AND TUBES.

By WALTER C. SEELYE, M.D.
OF WORCESTER.

READ JUNE 7, 1910.

THE PLASTIC SURGERY OF THE OVARIES AND TUBES.

In dealing with the surgical treatment of ovaries, it is necessary to bear in mind the effect of these organs, both in their normal and pathological conditions, upon the organs correlated with them. In the past few years much work of interest and importance has been done by physiologists on the subject of hormones (ὁρμάω to arouse, excite) or the active principle of the internal secretion of glands. In experimental work on animals, Bayliss and Starling obtained an explicit example of how one organ controls the activity of another organ by means of a specific chemical substance given off to the blood. Edkins states that this effect is not a nervous reflex, but a stimulation of one organ by chemical products formed in another. Howell says: "We might modify the definition so far as to designate as hormones, those substances in solution which, conveyed from one organ to another through any of the liquid media of the body, effect a correlation between the activities of the organ of origin and the organ on which they exert their specific effect." Among the hormones of the various glands of the body that are either proved or assumed to exist, and which are held responsible for certain well-known correlation of functions, are mentioned a hormone in the ovary which controls the growth of the uterus and the processes of menstruation, and a hormone which controls the implantation of the fertilized ovum and growth of placental tissue.

In "The Making of Species," by Dewar and Finn, it is shown that the development of secondary sexual characteristics is dependent on the secretion of these hormones. These secondary sexual characteristics usually affect the skin,

especially epidermic appendages and the superficial parts of the skeleton, or whole limbs and appendages. Experiments of injecting the extract of the testes of a cock into the hen bird have produced wattles and tail feathers in the latter similar to those of the cock. Many birds in captivity lose some of the beauty of their plumage, and another curious fact is that the male plumage sometimes appears pathologically in the hen birds, more especially in those that have become sterile from age or disease. Such phenomena as these suggest that in some cases the bright colors of the male may be pathological, and that the hormones secreted by the male sexual cells may exercise an injurious effect on the body tissue. Further investigation may prove, what at present may be reasonably assumed, that more of the functional disorders of the uterus have their origin in pathological conditions of the ovaries.

In dysmenorrhea, the prevailing opinion at present is that mechanical obstruction, such as by membranes, or by flexions of the uterus, are not possible causes of this condition. It has been many times proven that obstruction is not absolutely present in these cases, that probes of small caliber can invariably be passed into the uterine cavity, and that the flow of blood is so slow that any patency whatever of the uterine canal would allow the blood to pass, even if violent spasmodic contractions should momentarily shut off the canal. There is every reason to believe, therefore, that the pain is due to the abnormal spasm rather than to any obstruction to the flow. It has, on the contrary, also been well shown that where there was from some cause complete obstruction, pain has been absent. Spasmodic contractions of the uterus are generally acknowledged to be the cause of pain in dysmenorrhea, and only about one-third of women menstruate without pain. But it is the cause of this abnormal spasmodic contraction that has given rise to so much perplexity in the question. Some writers have attributed

it to a cervicismus, or hyperesthesia of the mucous lining of the cervical and uterine canal with a tight contracted cervix. The least touch of a probe on this sensitive tissue may cause great pain, and the natural conclusion is that the flow of blood and membranes over this surface causes pain, and thence the spasm of the uterus. But the fundamental cause must lie deeper, and if the perfectly normal functions and painless contractions of the uterus during menstruation, in the fortunate one-third of menstruating women, are regulated by the properly balanced hormones from the ovaries, it seems reasonable to suppose that any slight abnormality in the ovaries may upset that balance and so produce the condition of contracted cervix and spasm of the uterus in dysmenorrhea.

The experimental work on this subject is still open for further investigation. It is evident, however, in the limited field of observation, that dysmenorrhea and often other irregularities of menstruation are invariably associated with pathological ovaries, with or without abnormalities in the tubes. Gibbons, of London, says: "When the amount of properties of the ovarian secretion are absolutely normal, no alteration takes place in the regular menstruation, but where it contains some abnormal constituent, or its elements are not duly proportioned, then the action of the blood causes the secretion preceding menstruation to irritate the uterine mucous membrance and give rise to the reflex action leading to painful contractions." With perfectly normal acting ovaries, then, may be associated a normal menstrual life, which is in turn associated with normal sexual instincts and fertility. For these reasons it is desirable to do all that is possible toward preserving or restoring these important functions by reparative operations on the ovaries and tubes.

Surgical treatment of ovaries and tubes has passed through several periods of development, from extreme radicalism to extreme conservatism, till now, in the light of the history

of experience, it is possible to formulate a little more closely the present attitude lying somewhere between these two extremes. No general rule can be applied for all cases, but each must be a study by itself, and judged according to age, domestic conditions of life, number of children, miscarriages, menstrual history past and present, inflammation past or present, acute or chronic, and neurasthenic conditions.

With these points in view I will attempt a classification of cases as a guide to the mode of procedure in any given case.

1. Young, unmarried women, or women in early married life, with no pregnancies, who have had continual and severe dysmenorrhea, constitute the first class in which the very history demands a pelvic operation.

The findings are almost invariably unicystic or polycystic ovaries, often bound down by adhesions into the posterior cul-de-sac, or to the sides of the pelvis, varying in size from ovaries slightly larger than normal to those four or five times that size. Considering that such a woman has the best part of her life before her, she represents the class for maximum conservatism.

If both ovaries are only slightly enlarged and finely polycystic throughout, they are better left and not resected, but must be carefully freed from any abnormal positions and adhesions that they have usually acquired. They must be then brought high up in the pelvis, taking care at the same time that the tubes are free. The ovaries in this case may be gently suspended or hitched over to a higher position on the broad ligament, or even, in some cases, passed through the broad ligament and fastened to the anterior surface.

If one ovary of this class is as above described, and the other greatly increased with one or a few cysts, the latter may be resected if the main body of the ovary is normal; but if there is a mere shell of normal tissue left, total extirpation is the safer method, leaving the other ovary whole.

If both ovaries have undergone serious cystic degeneration and there is any normal tissue left, it seems reasonable in this particular class to preserve part of one ovary at least. It seems more reasonable to preserve the function of menstruation and the effect of properly balanced hormones, if possible, in a woman of this class, in spite of the chance of a subsequent operation, than to sacrifice all at the first blow.

In resection of ovaries in such cases, there must be great care to preserve the normal circulation and avoid constriction, which leaves the ovary prone to further cystic degeneration. A maintenance high in the pelvis is generally recognized as an important step after any cutting operation on the ovary. By so doing the return circulation may be made, if possible, more free than before, and thus help in naturally reducing the ovary to a normal condition. In all my cases of resection of ovaries, plain cat-gut, No. 1 or 2, is used in an over-and-over suture, care being taken to have good approximation of the edges to avoid adhesions, and also to leave no dead spaces for a chance of hematoma.

2. Married women between 30 and 40 years of age, with one or more children, form the second class.

Here the point of view changes somewhat. There is less of the woman's menstrual life to be conserved at this point, and certain sacrifices of ovaries may be made that would be unwise in the first class.

Where both ovaries are badly involved in cystic degeneration, and evidently undermining the health, the point of conserving the woman's condition may outweigh that of conserving the ovary, with all its possibilities of future return of trouble. In such a case the patient's attitude of mind must be carefully considered, and unless she insists on ovarian tissue being left, and bearing the responsibility herself, such ovaries should be removed in toto.

J. O. Polak believes the field of ovarian resection a very

limited one. In 300 cases thus operated he found that 41, or 12%, returned for further operation, requiring ablation of the remaining ovary or of the remaining portion of a resected ovary that had been left at the primary operation.

In cases of cystic degeneration of this class careful judgment is necessary as to the proper procedure. This, it seems to me, depends upon how completely the ovary is involved. If the cyst formations are large and confined pretty well to one end of the ovary, it is reasonable to believe that resection may be done with good results, but if there is no considerable part of the ovary free from degeneration it is doubtless best to remove the entire ovary. On the other hand, the ovaries that are only slightly larger than normal, and involved in the tiniest cystic formations, are best let alone and secured in a high position.

Cysts of the corpus luteum sometimes grow to considerable size and can be shelled out of their capsule leaving normal ovarian tissue behind. In all forms of large tumor growths of the ovaries, whether benign or malignant, there is no justification in leaving any portion of the ovary. But a difference of opinion arises in the condition where one ovary is perfectly normal and the other malignant, whether to remove the normal ovary also. No less an authority than H. A. Kelly says: "If malignant disease exists on one side it is safer to remove the opposite side also." Other writers do not favor such a procedure, and the individual case must be judged according to circumstances.

3. Women on a near approach to the menopause form a third class in which the minimum of conservatism is reasonable.

Abnormal ovaries with any probability of causing future disturbance should unhesitatingly be removed. Any attempt at resection or transplantation of ovaries, combined with plastic operations on the tubes, either to preserve the effect of hormones, menstrual life, or possibility of pregnancy, seem

unreasonable in this class of cases. A rare exception, however, may occur in a woman who is anxious to risk everything for the remote chance of a first pregnancy.

4. The fourth class comprises cases of acute or chronic inflammation, and those that have completely subsided from the same.

In cases of acute inflammation of tubes and ovaries it is the generally recognized attitude, both abroad and in America, to wait, if possible, till the acute symptoms have subsided. If this is not possible, a fact to be determined by the run of the patient's condition, open drainage must be obtained either by vaginal puncture or median incision into the pelvis from above, and any more extensive operation deferred till a later date. Any plastic operations in the acute stage can be nothing but dangerous and are not to be considered.

In chronic inflammation there must be a careful consideration of the woman's condition, taking into account the duration of the inflammation. In those cases of long standing, where the woman's health is at stake, total extirpation of tubes and ovaries may be necessary, but many of them offer favorable conditions for plastic work. If the ovaries are normal and the inflammatory area or pus sac is definitely confined to a small portion of the tube, this may be excised without contaminating the surrounding area, and the proximal end of the tube left patent by sewing the mucous membrane to the peritoneal surface.

J. Clarence Webster resected the fimbriated end of a tube, and at a later date found, on opening the abdomen, that fimbriæ had formed at the resected end of the tube.

Plastic work on the tubes has been unsatisfactory to a large degree, and Polak has abandoned the practice altogether, as he found the results disappointing; but if such work is to be done at all, the most favorable class for its practice is that which has gained complete recovery from the

inflammation of the tubes. Here the tubes will almost invariably be occluded by adhesions and cicatrization. Pregnancy is the only consideration for plastic operations on such tubes, for menstruation will usually continue normally provided the ovaries are left. Even though such operations are discredited by some, if, from the woman's stand-point, a possibility of pregnancy is the greatest thing at stake, it seems reasonable to take advantage of every measure that may restore such a function. Plastic operations on the tubes of these cases can do no harm, and may bring untold happiness to a family by making possible the birth of a child, as has been the case in a few instances, even where the tubes were partially destroyed and a resected ovary was transplanted to the uterine portion of the tube.

F. H. Martin has obtained pregnancy by this procedure which he calls homotransplantation. Kelly reports a case where but one tube was left and one ovary on the opposite side, in which pregnancy followed.

5. The fifth class of cases is represented by young women in early life who have had total extirpation of both ovaries, and are contemplating marriage.

These are open to a last resort, namely, transplantation. The earlier it is performed, the more likelihood there is of any success. Martin, in his interesting experiments of heterotransplantation, or the transplantation of a portion of an ovary from one woman to another, cites a few cases in which menstrual life was partially restored, and states the report of another case in which conception followed.

6. The last class, that of neurasthenic cases, must always be judged most guardedly.

Whether their symptoms are from causes of a pathological or functional nature must be absolutely determined, if possible. The old saying "Never operate on a neurasthenic" is perhaps only too true when bearing upon the sexual organs. It is safe to say that these patients belong in the

first place in the hands of a neurologist, and only as a last consideration should any attempt be made in reparative operations in such cases.

The 35 cases on which I have operated in the past two years, 9 single and 12 married, or 21 in all, represent classes 1 and 2, with dysmenorrhea and irregularities in catamenia; 10 had resection of one ovary; 5 had double resection of ovaries; 6 had resection of one and extirpation of the other ovary.

Of these, all but one had marked immediate relief from dysmenorrhea, and the relief has held to the present time.

In two of these cases dysmenorrhea was of much severity, so that the patients had to go to bed for several days at each period. The intervals were shortened, and the patients had only about one week free from pain between periods. These were not only relieved of dysmenorrhea, but the periods became normal in time.

The one case unrelieved was of the first ten, and was one in which resection or extirpation of the untouched ovary ought to have been done, for it was large and cystic. She will probably return for secondary operation.

Of the remaining 14 cases, four were over 40 years of age, and had chronic inflammation of both tubes and ovaries. Total extirpation was performed in each. One was a large cyst of one ovary, which was removed; another was a cyst combined with a pus tube on one side, and was removed with the tube. Eight had resection of one or both tubes, on account of occlusion from past inflammation. The lumen was left patent, and the ovary brought into close contact with the proximal end of the tube. In these 14 cases, the late results of four are unknown, the rest have been in good health with no symptoms. No pregnancies have yet been reported.

In conclusion, I would emphasize, first, the plea for more abdominal operations on the pelvic organs in cases of severe

dysmenorrhea, and, second, the importance of a classification as an aid in determining the mode of procedure in a given case for operation on the ovaries and tubes.

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DISCUSSION.

Dr. Ernest B. Young, of Boston: We have listened to a very interesting paper upon an important subject. A great deal of our pelvic surgery in the hospitals, on account of the condition of the patients and their social station, has to be of a radical nature, and it is a good thing to occasionally consider the more conservative methods of treatment.

All the principal points have been well touched upon by the speaker. There is one point concerning which I would like to say a word, and that is, in relation to operations upon

the tubes after inflammatory conditions in the pelvis. If we are to obtain favorable results we must proceed cautiously, and allow time for as complete a resolution as possible before beginning. Some German investigated these cases of tubal infection, made cultures, and found it was nine months on the average before the various cocci in the tubes became harmless. So a considerable time must be allowed to elapse after infection, before we can hope to operate with good results or with safety to the patient.

Then, in the next place, various investigations have shown that operations of a conservative nature upon the tubes are much less successful than upon the ovaries. Dr. W. L. Burrage published two interesting papers upon this subject some years ago. He divided the cases into gonorrhœal infections and those which arise from pelvic infection after miscarriage; or rather, I should say, from the infections with the more common pus cccci after miscarriage and full term labor.

The conditions in these two classes are entirely different. In gonorrhœa we find large tubes with heavy walls, thickened, and intimately and broadly adherent to the bottom of the pelvis and to surrounding structures—often filled with pus. Thus we are working, as a rule, with hopelessly diseased tissue which are unable, I believe, to perform their functions under any conditions. If we destroy adhesions, large, raw surfaces are left to contract new adhesions, and the conditions at the end are apt to be no better than when we began. However, we need not entirely despair, for I know of a case where one ovary and tube were removed and the other ovary left with a resected tube. This woman became pregnant four times after the operation and gave birth to four living children. But this is the exception; not the rule. I have personally never seen a successful plastic upon the tubes after gonorrhœal infection, and where cases have apparently recovered perfectly, and the abdomen has been opened subsequently, the abdominal extremities of the tubes have been always closed.

In the septic infections after miscarriage and labor, due to the more common cocci, the conditions found are entirely different. The brunt of the inflammation in this class falls upon the cellular tissues of the pelvis, and the tubes are frequently little affected. When the abdomen is opened at

the height of the process the tubes are often perfectly free and their ostia patulous. Then, again, they less often contract the deep, broad pelvic adhesions which we find in the gonorrhœal cases; for the infiltrated broad ligaments lift the tubes out of the pelvis and the adhesions are of an entirely different character. In the gonorrhœal cases, as I have said before, the adhesions are very dense, and when broken they bleed. In the other class they are long, diaphanous, and have a very poor blood supply. They do not bleed when broken, and no large raw surfaces are left for future peritoneal adhesions. After the worst cases of puerperal sepsis, even with the streptococcus, the tubes are frequently open; the walls are thin, and the feel is that of normal tissues. In the post-puerperal cases it may be possible to do something to aid pregnancy by breaking up such adhesions as constrict, or displace the fimbriated extremity of the tube; but I do not believe, except where the tubes are absolutely closed, that we can do much to help pregnancy by operation, for if the tubes are patulous they are in condition to fulfil their purpose as well before as after any plastic.

Thus it appears to me that the prognosis in all cases of conservative operation upon the tubes must depend primarily upon the physiological condition of the tube itself and upon the extent and nature of the adhesions. After gonorrhœal infection the chance of success is very slight. On the other hand, after puerperal infection with the ordinary pus organisms, the opportunity for success is vastly greater.

Dr. Malcolm Storer, of Boston: I have been much interested in the various ingenious theories advanced by Dr. Seelye to account for ovarian dysmenorrhœa. In the cases of pain preceding menstruation, however, I cannot but feel that a quite sufficient explanation is to be found in the fact that it may be painful for an ovary to enlarge with the congestion coincident with menstruation if it is buried in a mass of adhesions.

I have for years been strongly in favor of the utmost conservatism that is consistent with good work, in cases when a child is desired, and should even go so far as to say that, while, of course, the woman's life is the first consideration, we should have the greatest possible hesitation

before performing an operation that will render further child-bearing impossible. The reproach is sometimes brought against these conservative operations that often a secondary operation is needed. That, doubtless, is so; but if, between the two operations, a previously sterile woman gives birth to a child, I think in most cases she would regard the second operation as a very slight price to pay.

I agree thoroughly with what Dr. Seelye has said about avoiding operation, other than vaginal drainage, in the presence of acute inflammation. One can, however, generally operate with impunity long before the nine months some writers have mentioned as necessary to elapse after the acute stage. I regard two or three weeks quite long enough to wait in most cases.

I do not at all agree with the writers Dr. Seelye has quoted who are so sceptical as to the benefit of plastic operations upon the tubes. One is apt to be influenced by one's personal experience, and the happiness of several mothers upon whom I have performed plastic tubal work has not served to mitigate my enthusiasm at all. In one case I removed an ovarian tumor on each side, each containing some two quarts, and left on one side a tiny fragment of an ovary. At the same time I built a new ostium in a hydrosalpinx on one side and resected the middle third of the other tube, anastomosing the healthy fimbriated end with the uterine stump of the tube, and the woman got pregnant within a year, and has had another child subsequently.

Dr. Seelye has spoken of ovarian transplantation. I can contribute a case.

Some years ago a woman, who had had one ovary and both tubes removed, told me that she wished to marry again, but her proposed husband insisted that first something be done that should render pregnancy at least a possibility. I accordingly split the fundus uteri and sewed one half of her ovary into the uterine wall so that its surface projected into the uterine cavity. Two years later the woman had all the symptoms of pregnancy, but at three months gave birth to a fleshy mole, evidently a very early pregnancy gone wrong. I feel that this subject of ovarian transplantation is one of great promise.

I have enjoyed Dr. Seelye's highly suggestive paper very much.

Dr. E. W. Cushing, of Boston: I do not know whether I understood the reader correctly as saying that the common dysmenorrhea of young women was to be attributed largely to disease of the ovaries. If I did so understand correctly, I beg leave to differ with that view, for it is evident that the simple dilatation of, and putting a stem in, the uterus will in the great majority of cases cure that dysmenorrhea without opening the pelvis. Where there are adhesions following inflammation it is a very different class of cases. In regard to the removal of cystic ovaries, not ovaries with a cystoma, but with many little cysts in them, I should be very loth certainly to remove both. We have found good—in fact, excellent—results by resecting, but the old method of simply opening the cysts—letting the fluid out by puncture with a needle—is often all that is required. These little cysts are caused presumably by a thickening of the outer wall of the ovary, which does not allow the exit of the ovum and the fluid which accompanies it.

It is a sad and serious thing to remove both ovaries in a young woman. "*Crede experto.*" Menstruation is to her the sign of her womanhood. She soon forgets the pains which seemed to justify the operation, and she grieves over the loss of potential motherhood, and yearns for the baby which she cannot ever have, and often refuses the offer of marriage she would otherwise gladly accept.

I have been through the different stages of which the writer speaks—of the removal of ovaries that should be saved, of the saving of ovaries that should be removed, until I have got to the middle course. But I am persuaded that at present there is a vast number of ovaries removed unnecessarily, a vast number of operations done which do not need to be done, where there is dysmenorrhea. With a heavy subinvoluted uterus and all the suffering that goes with it the tendency now is to lay the blame immediately to the ovary, and, instead of curing the subinvolution and endometritis, and supporting the ovaries, many enthusiasts remove the ovaries, and are as proud as Jack Horner of their deed.

In regard to surgery of the tubes, I believe in it. I believe in opening the tubes where there are adhesions around the end of the tube, sometimes removing the end of the tube and splitting it open in order to form a new ampulla

and provide for conception. In repairing tubes in that way I have had a number of cases where conception has occurred, although in one or two cases I have been given to understand that the patients wished I had not opened the tube, as conception was unwelcome.

The Massachusetts Medical Society.

PROCEEDINGS.

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The Massachusetts Medical Society.

PROCEEDINGS OF THE COUNCIL.

October 2, 1907.

A Stated Meeting of the Council was held in the Medical Library, Boston, on Wednesday, October 2, 1907, at 12, noon.

The President, Dr. George W. Gay, in the chair.

The following Councillors were present:

Bristol North.
S. D. Presbrey.

Bristol South.
J. A. Barré,
W. A. Dolan,
J. H. Gifford,
H. C. Kirby.

Essex North.
J. F. Burnham,
J. A. Douglass,
W. W. Pillsbury.

Essex South.
C. H. Bangs,
C. E. Meader,
P. C. Proctor,
H. E. Sears.

Hampden.
H. G. Webber.

Middlesex North.
J. B. O'Connor.

Middlesex South.
J. M. Crocker,
G. W. Gay,
A. A. Jackson,
H. E. Marion,
J. T. G. Nichols,
L. M. Palmer,
W. Preble,
C. E. Prior,
G. Ryder,
F. M. Sherman,
E. H. Stevens,
L. R. Stone,
I. E. Stowe,
W. H. Sylvester,
J. Tolman,
H. P. Walcott,
A. M. Wilkins.

Norfolk.
D. N. Blakely,
B. S. Blanchard,
M. J. Cronin,
C. G. Dewey,
F. W. Draper,
G. H. Francis,
D. D. Gilbert,
J. S. Greene,
T. F. Greene,
H. R. Hitchcock,
H. T. Holland,
G. N. Jones,
H. T. Mansfield,
E. G. Morse,
M. V. Pierce,
W. H. Robinson,
T. Smith,
E. Thayer.

Norfolk South.
T. J. Dion,
V. M. Tirrill.

Plymouth.
J. H. Averill,
C. W. Bartlett,
G. Osgood,
F. G. Wheatley.

Suffolk.
E. S. Boland,
J. F. Bush,
R. H. Fitz,
F. B. Harrington,
J. G. Mumford,
A. H. Nichols,
A. Post,
W. L. Richardson,
J. D. K. Sabine,
G. G. Sears,
F. C. Shattuck,

G. B. Shattuck,
A. K. Stone,
O. F. Wadsworth,
J. C. White.

Worcester.

O. H. Everett,
G. E. Francis,
H. Gage,
E. B. Harvey,
S. P. Holbrook,
E. W. Norwood,
E. V. Scribner,
L. Wheeler,
S. B. Woodward.

Worcester North.

S. E. Greenwood.

Total, 80.

The record of the last meeting was read and accepted.

The following were appointed Delegates to other State Medical Societies:

Vermont.—C. K. Cutter, of Somerville; H. G. Stetson, of Greenfield.

New York.—H. F. Vickery, of Boston; Henry Colt, of Pittsfield.

On motion of Dr. Wheatley it was

Voted, That a committee of three, of which the President of the Society shall be one, be appointed to consider and report at the next meeting of the Council what action, if any, it will recommend the Society to take in regard to defending its members in suits for malpractice.

The following were appointed to constitute the Committee:

G. W. Gay, F. G. Wheatley, C. H. Cook.

Adjourned at 12.30 P.M.

FRANCIS W. GOSS,
Recording Secretary.

February 5, 1908.

A Stated Meeting of the Council was held in the Medical Library, Boston, on Wednesday, February 5, 1908, at 12, noon.

The President, Dr. George W. Gay, in the chair.

The following Councillors were present:

Bristol North.
S. D. Presbrey.

Bristol South.
J. A. Barré,
A. W. Buck,
W. A. Dolan,
J. H. Gifford,
H. G. Wilbur.

Essex North.
J. F. Burnham,
J. A. Douglass,
W. W. Pillsbury.

Essex South.
C. H. Bangs,
H. K. Foster,
P. P. Johnson,
P. C. Proctor,
H. E. Sears,
J. A. Shatswell.

Hampden.
E. Flood.

Hampshire.
N. Holden,
V. S. Merritt.

Middlesex North.
W. P. Lawler,
J. H. Nichols,
J. B. O'Connor.

Middlesex South.
W. Ela,
G. W. Gay,
J. L. Hildreth,
A. A. Jackson,
H. E. Marion,
J. T. G. Nichols,
L. M. Palmer,
W. Preble,
C. E. Prior,
G. Ryder,
J. E. Somers,
L. R. Stone,
I. E. Stowe,
W. H. Sylvester,
F. W. Taylor,
J. Tolman,
H. P. Walcott,
A. M. Wilkins,
A. Worcester.

Norfolk.
S. W. Crittenden,
M. J. Cronin,
C. B. Darling,
D. D. Gilbert,
J. S. Greene,
T. F. Greene,
H. T. Holland,
W. W. Howell,
G. N. Jones,
E. G. Morse,
M. V. Pierce,
O. F. Rogers,
T. Smith,
H. R. Stedman,
W. A. White.

Norfolk South.
T. J. Dion,
V. M. Tirrill.

Plymouth.
J. H. Averill,
C. W. Bartlett,
N. K. Noyes,
G. Osgood,
A. E. Paine,
F. G. Wheatley.

Suffolk.
H. D. Arnold,
J. B. Ayer,
F. G. Balch,
E. S. Boland,
E. M. Buckingham,
J. F. Bush,
A. T. Cabot,
A. Coolidge, Jr.,
F. J. Cotton,
E. G. Cutler,
C. M. Green,
F. B. Harrington,
E. P. Joslin,
A. B. Morong,
J. J. Putnam,
J. M. Putnam,
W. L. Richardson,
T. M. Rotch,
G. G. Sears,
F. C. Shattuck,
A. K. Stone,
J. B. Swift,
H. F. Vickery,
O. F. Wadsworth,
J. C. Warren,
H. Williams,
G. Wolcott.

Worcester.	D. Harrower,	*Worcester North.*
W. P. Bowers,	E. B. Harvey,	F. H. Thompson.
O. H. Everett,	S. P. Holbrook,	
A. C. Getchell,	L. Wheeler,	Total, 100.
R. W. Greene,	S. B. Woodward.	

The record of the last meeting was read and accepted.

The following were appointed Delegates to other Medical Societies:

American Medical Association, 1908 and 1909.—H. D. Arnold, of Boston; J. A. Gage, of Lowell; O. J. Brown, of North Adams.

Alternates.—Edgar Garceau, of Boston; F. W. Anthony, of Haverhill; J. W. Spooner, of Hingham.

Maine.—F. S. Newell, of Boston; W. C. Keith, of Brockton.

New Hampshire.—F. P. Emerson, of Boston; G. P. Twitchell, of Greenfield.

Rhode Island.—J. M. Fay, of Northampton; J. P. Torrey, of Andover.

Connecticut.—T. S. Bacon, of Springfield; R. W. Lovett, of Boston.

New Jersey.—J. B. O'Connor, of Lowell.

The following Committee was appointed:

To Audit the Treasurer's Accounts.—M. V. Pierce, Godfrey Ryder.

The Committee on Membership and Finance reported, and in accordance with their recommendation it was voted that the resignations of the following be accepted:

John R. Cowan, of Danville, Ky.
Arthur K. Drake, of McComb, Ill.
William A. Dutcher, of Lowell.
Phœbe A. Ferris, of Butte, Mont.
Charles W. Gardner, of Bridgeport, Conn.
Hugh B. Gray, of College Point, N. Y.
Peter W. Hess, of Pawtucket, R. I.
Arthur O. Morton, of St. Albans, Vt.
W. Scott Nay, of Underhill, Vt.
James C. O'Donnell, of Northampton.

Also that the following be placed on the retired list:

Andrew Baylies, of Worcester.
Lauriston M Berry, of Junction, Wy.
Augustus P. Clarke, of Cambridge.
William D. Collins, of Haverhill.
Hasket Derby, of Boston.
Edward S. Eveleth, of East Gloucester.
Edwin Farnham, of Cambridge.
Albert S. Garland, of Gloucester.
John R. Greenleaf, of Gardner.
John B. Moran, of Roxbury.
Moses C. Stone, of Wellesley.
Reuben Willis, of Somerville.

Also that the following be deprived of the privileges of fellowship for non-payment of dues:

Joseph T. Callahan, of Woburn.
Willard C. Crocker, of Foxborough.
Winnifred P. Davis, of East Somerville.
Charles H. Harwood (residence unknown).
Francis H. Lally, of Milford.
Frederick B. Lawson (residence unknown).
Thomas E. Lilly, of Shirley.
John W. McKoan, of Worcester.
Thomas H. Maguire, of Dorchester.
Michael J. Meagher, of Lowell,
Horace S. Moran, of Wakefield.
Willard H. Pierce, of Greenfield.
Michael U. Robbins, of Newton.
Francis A. Robinson (residence unknown).
John D. Taylor, of East Boston.
Melville E. Webb, of Boston.
Willard I. Wiggin, of Lowell.
Richard Wynne, of Boston.

Dr. Marion, for the Committee on Medical Diplomas, in accordance with instructions from the Society, presented a revised list of medical colleges recognized for the purpose set forth in by-law 1.

Voted, That the list as reported be adopted.

The Committee appointed to consider the matter of the defence of malpractice suits presented a report, which after discussion was adopted.

(See Proceedings of Society, June 10, 1908, page 19.)

The Committee on State and National Legislation reported that the formation of a North Atlantic Branch of the American Medical Association had been carefully considered, and it was the unanimous opinion that it is inexpedient to take any action toward the formation of such a Branch.

Voted, to adopt the report of the Committee.

Dr. H. R. Stedman offered the following which, as amended by Dr. L. M. Palmer, was adopted:

Voted, That the Council of The Massachusetts Medical Society, believing that the best interests of the insane of the Commonwealth demand that the insane of Boston be placed under the care and supervision of the State, strongly advocates the measures now being taken to secure legislation to that end; and further, that the Council recommends the establishment of observation hospitals in the large cities of the State, and refers the matter to the Committee on State and National Legislation to put this vote into practical effect.

Adjourned at 1.20 P.M.

FRANCIS W. GOSS,
Secretary.

JUNE 9, 1908.

THE ANNUAL MEETING of the Council was held in Mechanic Building, Boston, on Tuesday, June 9, 1908, at 5 P.M.

The President, Dr. GEORGE W. GAY, in the chair.

The following Councillors were present:

Barnstable.
B. D. Gifford.

Berkshire.
J. F. A. Adams.

Bristol North.
A. S. Deane,
F. A. Hubbard,
S. D. Presbrey.

Bristol South.
C. A. Bonney,
W. A. Dolan,
J. H. Gifford,
G. deN. Hough.

Essex North.
J. F. Burnham,
C. G. Carleton,
I. J. Clarke,
C. P. Morrill,
J. F. Young,
L. J. Young.

Essex South.
C. H. Bangs,
D. Coggin,
R. T. Glendenning,
A. N. Greenwood,
E. B. Hallett,
H. E. Sears,
J. Shanahan,
J. E. Simpson.

Franklin.
G. P. Twitchell,
N. P. Wood.

Hampden.
G. E. Fuller,
D. E. Keefe,
A. O. Squier.

Hampshire.
A. M. Belden.

Middlesex East.
C. W. Harlow,
R. D. Perley.

Middlesex North.
J. E. Lamoureux,
J. H. Nichols,
C. E. Simpson.

Middlesex South.
L. B. Clark,
J. M. Crocker,
H. F. Curtis,
G. W. Gay,
H. E. Marion,
G. A. Miles,
J. F. O'Brien,
L. M. Palmer,
W. Preble,
C. E. Prior,
H. S. Rowen,
G. Ryder,
F. G. Smith,
E. H. Stevens,
E. P. Stickney,
L. R. Stone,
F. W. Taylor,
A. Worcester.

Norfolk.
B. S. Blanchard,
C. B. Darling,
F. P. Drew,
G. H. Francis,
D. D. Gilbert,
L. W. Gilbert,
H. T. Holland,
W. W. Howell,
G. H. Ingalls,
G. N. Jones,
M. V. Pierce,
H. V. Reynolds,
T. J. Shanahan,
H. C. Towle,
W. A. White,
A. M. Worthington.

Norfolk South.
F. J. Peirce,
J. W. Spooner.

Plymouth.
A. E. Paine,
F. G. Wheatley.

Suffolk.
J. B. Ayer,
E. H. Bradford,
E. M. Buckingham,
J. F. Bush,
A. T. Cabot,
C. M. Green,
B. J. Jeffries,
H. A. Lothrop,
J. H. McCollom,
J. G. Mumford,
A. H. Nichols,

J. M. Putnam,
W. L. Richardson,
T. M. Rotch,
G. B. Shattuck,
A. K. Stone,
H. F. Vickery,
O. F. Wadsworth,
G. H. Washburn,
H. Williams.

Worcester.

J. T. Duggan,
O. H. Everett,
G. E. Francis,
H. Gage,
R. W. Greene,
D. Harrower,
E. B. Harvey,
E. W. Norwood,
L. Wheeler.

Worcester North.

C. E. Bigelow,
E. P. Miller,
E. A. Sawyer,
F. H. Thompson.

Total, 105.

The record of the last meeting was read and accepted.

The Treasurer, Dr. BUCKINGHAM, read his annual report.

The Auditing Committee reported that they found the accounts correctly cast and properly vouched, and that the Treasurer has in his possession the securities called for.

Voted, To accept the Treasurer's report.

The Committee on Membership and Finance reported, and recommended that $4,500.00 of the surplus in the treasury be distributed among the District Societies.

Voted, That the recommendation be adopted.

In accordance with the recommendation of the same Committee it was voted, that the resignations of the following be accepted:

Nelson H. Clark, of Pittsburg, Pa.
Herbert C. deV. Cornwell, of New York, N. Y.
Louis P. DeGrandpré, of Montreal, P. Q.
Claes J. Enebuske, of New York, N. Y.
Laura Keisker, of Providence, R. I.

Also that the following be placed on the retired list:

Frank W. Draper, of Brookline.
John O. Marble, of Worcester.
Henry J. Millard, of North Adams.
William Richards, of Natick.
Charles P. Thayer, of Boston.

The Committee on Publications reported through Dr. Wadsworth.

Dr. Ernst, for the Committee on Medical Education, reported that the Committee had held numerous meetings to consider what, if anything, could be done to strengthen the requirements for registration in medicine in this State. At present the condition of things in Massachusetts is not one to be proud of. In the re-

quirements of preliminary education in Europe and America, the United States stands lowest; and Massachusetts, in common with thirteen other States and the District of Columbia, makes no requirements in this matter. This state with six others makes no requirement of preliminary medical training. It gives no authority to its Board of Registration to reject applicants from low grade medical colleges, nor has the Board provisions for reciprocity with other State Boards. The responsibility for the law in this State does not rest on the Board of Registration which has repeatedly recommended changes and improvements that, if adopted, would lessen some of the reproach that attaches to our present law.

The Committee stated that it realized, as do the members of the Board who have been consulted, the unsatisfactory nature of the present State examinations. It suggested adding a practical test to the written examination—as for an applicant for registration to be required to show his knowledge of common laboratory methods of diagnosis, bandaging, etc., and, if possible, to come in contact with one or more patients.

The Committee further reported that the Board of Registration has been obliged to work without that active interest and encouragement that is its due from powerful bodies that should support it; and the Committee requested an approval of its report, and authority to act as the representative of the Council in further efforts to improve the conditions of registration in Massachusetts, especially in the direction of a practical examination.

Voted, To accept the report and to adopt its recommendations.

Dr. Sears, for the Committee on State and National Legislation, reported that they have appeared before Legislative Committees, in favor of a bill to regulate expert testimony; to establish an observation hospital for insane patients, and to turn the care of Boston's insane over to the State; and against bills to provide for the registration of osteopathy; to establish a board of registration in optometry; and to prohibit compulsory vaccination.

The expert testimony bill received leave to withdraw. The bill for the State care of the insane has passed the Senate and is now before the House. The bill to establish an observation hospital was favorably reported by the Committee.

The optometrists were given leave to withdraw and the osteopaths were referred to the next General Court. The present law regarding compulsory vaccination was amended so as to remove the fine for neglect to vaccinate children within two years of birth.

Voted, To accept the report of the Committee.

The Librarian, Dr. BRIGHAM, presented his annual report.

The Committee on Nominations reported a list of candidates for the offices of the Society for the ensuing year, and the same were elected by ballot:

President . .	SILAS D. PRESBREY, of Taunton.
Vice-President . .	DANIEL E. KEEFE, of Springfield.
Secretary . .	FRANCIS W. GOSS, of Roxbury.
Treasurer . .	EDWARD M. BUCKINGHAM, of Boston.
Librarian . .	EDWIN H. BRIGHAM, of Brookline.

JAMES G. MUMFORD, of Boston, was chosen Orator for the annual meeting of the Society in 1909.

The following Standing Committees were appointed:

Of Arrangements.

Lincoln Davis, G. H. Francis,
L. W. Gilbert, A. N. Broughton,
C. C. Simmons, F. C. Kidner.

On Publications.

O. F. Wadsworth, G. B. Shattuck, H. L. Burrell.

On Membership and Finance.

F. W. Goss, Walter Ela, C. M. Green,
A. Coolidge, Jr. Samuel Crowell.

To Procure Scientific Papers.

R. C. Larrabee, Charles Harrington, Christopher Seymour,
E. W. Taylor, F. B. Lund.

On Ethics and Discipline.

Leonard Wheeler, J. A. Gage, J. W. Bartol,
Henry Jackson, G. deN. Hough.

On Medical Diplomas.

H. E. Marion, O. F. Rogers, H. W. Newhall.

On Medical Education.

H. C. Ernst, H. D. Arnold, C. H. Williams.

On State and National Legislation.

S. D. Presbrey, G. G. Sears, D. D. Gilbert,
C. H. Cook, C. F. Withington.

A petition from the Essex North District Medical Society requesting that action be taken as to medical contract work, and also a similar request presented from the Norfolk South District Medical Society by Dr. Spooner, were read.

Voted, That the matter be referred to a Committee of three to report thereon at the next meeting of the Council.

The following were appointed to constitute the Committee: W. A. Dolan, of Fall River; J. A. Gage, of Lowell; C. E. Durant, of Haverhill.

Dr. Gilbert presented the following, which was adopted:

Whereas, the duties of the Standing Committees are intimately connected with the work of the Council,—

Voted, That such members of the Standing Committees as are not Councillors be invited to attend as guests the meetings of the Council, and that the Secretary be hereby instructed to send to such said members the regular notices of the meetings.

Dr. Wadsworth presented a statement regarding the prevalence of ophthalmia neonatorum in Massachusetts, and the damage done by the disease. How best to remedy the existing state of affairs is not altogether a simple question. He moved and it was voted, That a Committee of five be appointed to consider what measures should be taken by the Society to prevent the occurrence and secure the prompt and effective treatment of ophthalmia neonatorum.

The following were appointed the Committee: O. F. Wadsworth, E. T. Easton, F. E. Cheney, David Harrower, J. W. Bartol.

On motion of Dr. Harvey, amendments were adopted to the fifth and sixth sections of the act for the defence of malpractice suits approved at the last meetiug, and it was voted that the code as now approved by the Council be presented to the Society for its adoption.

(See Proceedings of the Society, June 10, 1908, page 19.)

Adjourned at 6.20 P. M.

FRANCIS W. GOSS,
Secretary.

The Massachusetts Medical Society.

PROCEEDINGS OF THE SOCIETY.

ANNUAL MEETING.

First Day.

June 9, 1908.

Sectional meetings were held in Mechanic Building, Boston, on Tuesday, June 9, 1908, at 2 P.M.

The Sections were organized and papers were presented as follows:

SECTION IN SURGERY.

Dr. Homer Gage, Worcester . . . . . Chairman.
Dr. R. B. Greenough . . . . . Secretary.

Fracture Treatment as Affected by the X-ray, with Demonstration of Cases.—By Dr. F. J. Cotton, of Boston.

Fracture of the Lower Epiphysis of the Tibia.—By Dr. F. S. Coolidge, of Pittsfield.

Stiff and Painful Shoulders (Sub-Deltoid or Sub-Acromial Bursitis).—By Dr. E. A. Codman, of Boston.

Pure Radium Bromide rather than Operation or X-rays in the Early Treatment of some Superficial Cancers, especially Epithelioma, with demonstration of cases.—By Dr. F. H. Williams, of Boston.

Exhibit of X-ray Plates of Fractures, from the Massachusetts General Hospital.—By Dr. C. C. Simmons, of Boston.

SECTION IN MEDICINE.

Dr. B. P. Croft, Greenfield . . . . . Chairman.
Dr. R. C. Larrabee, Boston . . . . . Secretary.

The Need and Value of Health Inspection Work.—By Dr. L. A. Jones, of North Adams.

State Sanitary Supervision.—By Dr. H. C. Emerson, of Springfield.

The Occurrence and Distribution of Infantile Paralysis in Massachusetts in 1907. (From the State Board of Health of Massachusetts).—By Dr. R. W. Lovett, of Boston.

Tuberculin as a Diagnostic Measure in Tuberculosis.—By Drs. Cleaveland Floyd, of Brookline, and H. K. Boutwell, of Boston.

The Use of Fresh Animal Sera in Hemorrhagic Conditions.—By Dr. Timothy Leary, of Boston.

SECTION ON TUBERCULOSIS.

Dr. A. T. Cabot, Boston . . . . . Chairman.
Dr. T. F. Harrington, Boston . . . . . Secretary.

The Necessity of Disinfection after Death or the Removal of Tuberculous Patients.—By Dr. Henry Jackson, of Boston.

Home and District Care of the Tuberculous.—By Dr. A. K. Stone, of Boston.

The Necessity for a Commission to Suggest Suitable Employment for the Cured Cases of Tuberculosis.—By Dr. Alfred Worcester, of Waltham.

At 8 p.m. the Shattuck Lecture was delivered by Frederick Forchheimer, M.D., of Cincinnati, Ohio.

Following the lecture an informal social hour was passed, with music and refreshments.

Second Day.

June 10, 1908.

The Society met in Mechanic Building, Boston, on Wednesday, June 10, 1908, at 9.30 a.m., for the exercises of the hundred and twenty-seventh Anniversary.

The President, Dr. George W. Gay, in the chair.

The record of the last annual meeting was read and accepted.

The Secretary announced that 130 Fellows had been admitted during the past year and that 51 deaths had been recorded.

The following are the lists:

Admissions reported from June 12, 1907, to June 10, 1908.

1907	Adler, Herman Morris	Boston.
1907	Andrews, Frederick Francis	Revere.
1907	Ballou, Ambrose Roche	Randolph.
1908	Besse, Frank Adelbert	Orleans.
1908	Boos, William Frederick	Boston.
1908	Brady, Joseph Edward	Brockton.
1907	Brickley, William Joseph	Charlestown.
1907	Brigham, Fred Clayton	Springfield.
1907	Bright, James Cooper	Fall River.
1907	Brown, Lloyd Thornton	Boston.
1908	Buckley, James Thomas	Marlborough.
1907	Burbeck, Edward Kimball	Springfield.
1908	Casselbury, Clarence Marmaduke	Boston.
1908	Cassidy, James Joseph	Lowell.
1907	Chase, Harrison Ayer	Brockton.
1907	Coffin, Frank Herbert	Haverhill.
1907	Cornwall, Andrew Payne	Boston.
1908	Curry, Ernest Francis	Sagamore.
1908	Cutter, Irving Taylor	Boston.
1907	Davis, Frank Albert	Boston.
1907	Dearborn, George VanNess	Cambridge.
1907	Dodge, George Francis	Wilmington.
1908	Donohue, Jeremiah Joseph	Worcester.
1907	Downey, Henry Arthur	West Springfield.
1907	Dunham, George Perry	Lawrence.
1907	Elder, Fred Orestes	Haverhill.
1908	Ellis, Arthur Henry	Orange.
1908	Farr, Irvin Harris	Holyoke.
1907	Faxon, Nathaniel Wales	Stoughton.
1907	Faxon, William Otis	Stoughton.
1908	Gaffney, Mary Evangeline	Salem.
1908	Gates, Raymond Eugene	Boston.
1908	Giguere, Alfred Joseph	North Adams.
1907	Gould, Chester Harlow	Braintree.
1907	Gregg, Donald	Cambridge.
1907	Hale, Edith	Wellesley Hills.
1907	Harrington, Clifton Ward	Boston.
1908	Harrison, Columbus William	Boston.
1908	Hawkins, Henry	Dorchester.
1907	Henderson, Charles Russell	Reading.
1908	Higginbotham, Fred Augustus	Cambridge.

1908	Hoban, James John	Lowell.
1907	Hoch, Theodore Augustus	Worcester.
1908	Hollings, Charles Byam	Cambridge.
1907	Houghton, Henry Lincoln	Winchester.
1908	Howard, Alonzo Gale	Boston.
1908	Howland, Clifford	Salem.
1907	Hubbell, Herbert Newton	Haverhill.
1908	Hussey, William Francis	Roslindale.
1907	Johnson, Erik St. John	New Bedford.
1908	Johnston, William	Dorchester.
1908	Jones, James Ambrose	Lynn.
1907	Keenan, George Francis	Boston.
1908	Kelly, Alice Elizabeth	Detroit, Mich.
1908	Kelly, John Michael	Dorchester.
1908	Klein, Isaac	Boston.
1907	Ladd, William Edwards	Boston.
1908	Langnecker, Harry Leslie	Cambridge.
1907	Lanpher, Howard Arthur	Springfield.
1907	Lawrence, Harry Hitchcock	Fitchburg.
1907	Lee, Roger Irving	Boston.
1908	Lemaire, William Franklin	Lynn.
1908	Lesses, Max	Salem.
1907	Lewis, Edwin Ray	Clinton.
1908	Lundwall, Lawrence Svante Bernhard	Brockton.
1907	McCaffrey, Hugh Edward	Leominster.
1907	McCann, James Henry	South Framingham.
1908	McCarthy, Eugene Justin	Malden.
1907	McCready, Leo Thomas	Jamaica Plain.
1907	McGurn, William J	Roxbury.
1908	McIntire, George Francis	Cambridge.
1907	MacLeod, John Malcolm	Quincy.
1908	MacLeod, Norman Murray	Beverly.
1907	Maguire, Daniel Francis	Boston.
1908	Magune, Frank Leroy	Worcester.
1908	Maloney, John Martin	Springfield.
1907	Marr, Myron Whitmore	Springfield.
1907	Metcalf, Carleton Ray	Boston.
1907	Mixter, William Jason	Boston.
1907	Monty, Adelbert Howard	Attleborough.
1907	Moran, Charles Leo	U. S. Navy.
1908	Murphy, Anna Frances	Worcester.
1907	Murphy, James Cornelius	Norwood.
1908	Neff, Irwin Hoffman	Foxborough.
1908	Newton, Ralph Waldo	Brockton.
1907	O'Leary, Joseph Augustus	Wakefield.

1908	Paine, Nathaniel Emmons	West Newton.
1907	Peabody, Francis Weld	Boston.
1908	Pearce, Arthur Cushing	Dorchester.
1907	Peck, Roy Hamilton	Springfield.
1907	Perkins, Harry Bradford	Haverhill.
1907	Playse, Linn Foss	Hopkinton.
1907	Pofcher, Elias Harry	Worcester.
1907	Prince, Calvin Oliver	Stoneham.
1907	Proctor, Thomas Melville	Walpole.
1908	Raymond, Katharine Piatt	Wellesley.
1908	Reed, Laurence Bradford	Plymouth.
1907	Reynolds, George Edward	Pittsfield.
1908	Rice, John Evarts	Worcester.
1907	Richardson, Cheslie Alvah Clarence	Somerville.
1908	Richardson, Edward Peirson	Boston.
1907	Riley, Charles Allen	Allston.
1907	Robbins, Eugene Stanley	New Bedford.
1908	Rushmore, Stephen	Boston.
1907	Sargent, Oscar Franklin Libbey	Lawrence.
1908	Shay, Charles Edwin	Roxbury.
1908	Sibley, Benjamin Ernest	Brookline.
1907	Spear, Louis Mahlon	Boston.
1907	Stansfield, Clarence Winfield	Fall River.
1907	Stephens, Frederick Newton	Somerville.
1908	Stevens, Horace Paine	Cambridge.
1908	Still, Carroll Wilder	Malden.
1907	Sullivan, John Thomas, Jr.	Boston.
1908	Sweeney, Edward Joseph	Springfield.
1908	Swift, Milne Barker	Fall River.
1907	Swift, Walter Babcock	Boston.
1907	Sylvester, Philip Haskell	Newton Centre.
1908	Thompson, William Lawton	East Boston.
1908	Towle, Edwin Dudley	Salem.
1908	Troy, Alice Gertrude	Worcester.
1908	VanNüys, Fresenius	Weston.
1908	Walker, Harry Abram	Somerville.
1907	Wardle, Henry	Fall River.
1908	Warner, Carmillus Turten	Marlborough.
1907	Warren, Lizzie Maude	Baldwinsville.
1908	Watson, John William	Beverly.
1908	Weaver, Harry Vernon	Boston.
1907	Wilcox, Henry Hopson	Springfield.
1907	Wood, Benjamin Ezra	Allston.
1907	Woodhill, Edith Esty	Waverley.

Total, 130.

List of Deceased Fellows.

Admitted.	Name.	Residence.	Date of Death.	Age.
1852	Beach, John Curran	New York, N. Y.	July 23, 1901	83
1850	Bonney, Franklin	Hadley	Nov. 9, 1907	85
1896	Branch, Charles Franklin	Amherst	Aug. 27, 1907	61
1889	Bridgham, Charles Burr	Cohasset	Sept. 17, 1907	66
1880	Brissett, Henry Rupert	Lowell	Oct. 13, 1907	64
1899	Burleigh, Robert Fletcher	South Braintree	Mar. 22, 1908	46
1872	Burton, Charles William	Adams	Oct. 5, 1907	61
1866	Cowdrey, Arthur Harris	Stoneham	Nov. 4, 1907	71
1881	Crittenden, Ralph Asaph	Haverhill	Jan. 27, 1908	60
1899	Dalton, Martin James	Melrose	Feb. 4, 1908	49
1897	Daniel, Vivian	Watertown	Sept. 24, 1907	41
1906	Day, Cushman	Boston	Oct. 26, 1907	25
1862	Deane, Ebenezer Alexander	Montague	May 31, 1908	83
1867	Disbrow, Robert	Boston	Nov. 9, 1907	65
1884	Faunce, Robert Harris	Sandwich	May 25, 1908	49
1894	Fillebrown, Thomas	Plympton	Jan. 22, 1908	72
1895	Flewelling, Douglass Scovil	Somerville	Jan. 31, 1908	46
1870	Folsom, Charles Follen	Boston	Aug. 20, 1907	65
1884	Frye, Charles Marshall	Lowell	June 17, 1907	48
1876	Garland, Joseph Everett	Gloucester	Dec. 16, 1907	56
1896	Goodwin, Elmer Ellsworth	Haverhill	Dec. 18, 1907	42
1903	Gould, Alfred Henry	Boston	Oct. 2, 1907	34
1891	Harlow, Granville Albert	Tyngsborough	Mar. 10, 1908	51
1859	Hay, Gustavus	Jamaica Plain	April 26, 1908	78
1879	Heald, William Frederick	Pepperell	Nov. 6, 1907	64
1857	Holmes, Horace Marshall	Adams	May 3, 1908	81
1876	Hutchinson, Marcello	Lynnfield	April 20, 1908	58
1875	Irish, John Carroll	Lowell	May 28, 1908	65
1888	Kennedy, Catherine Moloney	Springfield	April 13, 1908	64
1894	Kennedy, Charles Francis Joseph	Springfield	Mar. 11, 1908	41
1871	Leslie, Horace Granville	Amesbury	Aug. 22, 1907	65
1881	Lyons, Herbert Henry	Fitchburg	May 6, 1908	52
1855	McClean, Alexander Spear	Springfield	Feb. 22, 1908	86
1906	Miller, Vesta Delphene	Needham	Feb. 23, 1908	64
1906	Mitchell, Elmer Wesley	Fall River	Mar. 7, 1908	35
1882	Mixter, Orlando	Worcester	Feb. 6, 1908	66
1870	Morrill, Ferdinand Gordon	Boston	Dec. 25, 1907	64
1870	Morse, Edward Gilead	Roxbury	Mar. 24, 1908	59
1876	Norfolk, Walter Jenks	Plainfield, N. J.	Nov. 25, 1907	58
1877	Osgood, Hamilton	Boston	July 10, 1907	69
1877	Patterson, David Nelson	Lowell	April 23, 1908	53
1866	Perry, Charles Homer	Worcester	May 1, 1908	73
1874	Pomeroy, Stephen Franklin	Springfield	Jan. 11, 1908	80
1898	Pool, Charles Bret	Lowell	Oct. 8, 1907	38
1858	Robinson, Albert Brown	Roxbury	Mar. 29, 1908	73
1878	Smith, Jonathan Jason	Boston	Oct. 8, 1907	70
1883	Thompson, George Eben	Boston	April 11, 1908	48
1882	Thurlow, John Howard	Roxbury	Sept. 29, 1907	54
1905	Turner, Charles Humphrey	Blackinton	May 29, 1907	46
1904	Varnum, Leavitt R. J	Lowell	Jan. 21, 1908	30
1867	Winkler, Joseph Alexander	Jamaica Plain	Aug. 30, 1907	77

Total, 51

The Secretary presented from the Council the following Act which had received its approval:

AN ACT FOR THE DEFENCE OF SUITS FOR MALPRACTICE.

Active members of The Massachusetts Medical Society shall be entitled, on conditions hereinafter specified, to receive, without personal expense therefor, legal advice and court service of an attorney or attorneys-at-law in the employ of the Society, for the purpose of conducting their defence in any court in this Commonwealth, when they are accused of malpractice, or of illegal transactions in connection with the commitment of persons to institutions for the insane.

The legal services herein provided for shall be granted only on the following conditions: —

First: — Active members of the Society desiring to avail themselves of the privileges of this act, shall make application therefor in writing to the Secretary of the Society, and shall show to his satisfaction that they are members in good standing in the Society, and that all of their pecuniary obligations to the Society by way of dues and assessments have been duly discharged. They shall also furnish the Secretary at his request with a complete and accurate statement of their connection with and treatment of persons upon which complaints against them are based, giving dates of attendance, names of and residences of nurses and of other persons cognizant of facts and circumstances necessary to a clear and definite understanding of all matters in question, and shall furnish such other relevant information, if possible, as may be required of them by the Secretary or the attorney of the Society.

Second: — They shall agree not to compromise the complaints against them nor to make settlement of them in any manner without the advice or consent of the Society given through its attorney, nor shall they employ other counsel in aid of their defence without the consent of the Society.

Third: — In the event that they shall, without the advice or consent of the Society, determine to settle or compromise complaints against them, they shall reimburse the Society for the expenses incurred in undertaking their defence, and in default thereof, they shall be deprived of further privileges under this act.

Fourth: — In the event that members of the Society shall make requests under the provisions hereof, the President and Secretary acting together shall have the power to grant the same, or for cause to reject them, as the case may be, and to make such further provisions or requirements as may be deemed necessary for carrying out the purpose and intent of this act.

Fifth: — The Society shall not assume any responsibility for the payment of sums agreed upon by arbitration in the settlement of complaints, or awarded by court verdicts, or for making payments for any purpose whatsoever, except as specified in this act.

Sixth: — This act shall take effect upon its approval by the Council and adoption by the Society, and shall apply only to suits based upon professional services rendered subsequent to its adoption.

After discussion, it was voted to adopt the act as approved by the Council.

Dr. Cabot presented the following, which was adopted:

Resolved, That the members of The Massachusetts Medical Society, and the medical profession in general, be requested to urge upon those with whom they are brought in daily contact the advisability of supporting by their votes those candidates only who appreciate the importance of protecting the public health by the enactment of laws directed against impure, polluted milk, and other causes of preventable disease.

Papers were presented as follows:

The Growth and Development of Major Surgery in the Smaller Cities.—By Dr. C. H. Richardson, of Pittsfield.

The Immediate Treatment demanded in Certain of the More Serious Ocular Conditions that are frequently First Seen by the General Practitioner.—By Dr. F. E. Cheney, of Boston.

The Country Doctor's Relations with the Metropolitan Institutions and Specialists.—By Dr. Gilman Osgood, of Rockland. Remarks by Dr. M. H. Richardson, of Boston.

At 12 M. the Annual Discourse was given Dr. Thomas F. Harrington, of Boston.

Voted, That the thanks of the Society be presented to Dr. Harrington for his interesting address.

The following delegates from other State Medical Societies were present:

New Hampshire.—Dr. M. E. Kean.

Rhode Island.—Drs. A. A. Barrows and W. L. Munroe.

At 1 P.M. the Annual Dinner was served to eleven hundred Fellows.

FRANCIS W. GOSS,
Secretary.

TREASURER'S REPORT, JUNE, 1908.

Receipts.

Balance from previous year			$13,034 45
Assessments to District Treasurers:			
Barnstable	$125 00		
Berkshire	385 00		
Bristol North	260 00		
Bristol South	495 00		
Essex North	720 00		
Essex South	750 00		
Franklin	185 00		
Hampden	650 00		
Hampshire	295 00		
Middlesex East	285 00		
Middlesex North	535 00		
Middlesex South	1,735 00		
Norfolk	1,580 00		
Norfolk South	245 00		
Plymouth	320 00		
Suffolk	2,865 00		
Worcester	1,105 00		
Worcester North	325 00		
	$12,860 00		
Assessments to Treasurer	885 00		
" at Annual Meeting	1,065 00		
Assessments	$14,810 00		14,810 00
Annual Meeting:			
Sale of Dinner Tickets	10 00		
" " Space to Exhibitors	594 80		
Insurance on Microscope	15 00		
	$619 80		619 80
Income:			
Interest on deposits New England Trust Co.	177 02		
Interest on deposits Bay State Trust Co.	131 60		
Interest on deposits Franklin Savings Bank	43 38		
Interest on deposits Roxbury Institution for Savings	35 30		
Amount carried forward,			$28,464 25

Amount brought forward,		$28,464 25	
Interest on deposits Provident Institution for Savings	$37 84		
Interest on deposits Suffolk Savings Bank	37 84		
Interest on United States Bond	101 09		
" " Massachusetts Bonds	385 00		
" from Massachusetts Hospital Life Ins. Co.	842 33		
	$1,791 40	1,791 40	
Premium on check		25	
Redemption of United States Bond (Phillips Fund)		10,000 00	
Total Receipts		$40,255 90	$40,255 90

Expenses.

President's Expense		29 00	
Secretary's "			
Printing	$364 31		
Clerical work	36 10		
Stenographers	32 00		
Mailing Cases	2 33		
	$434 74	434 74	
Librarian's Expense :			
Printing, Stationery and Postage	$91 00		
Delivering Communications in Metropolitan District	103 92		
	$194 92	194 92	
Censors' Expense		498 00	
Supervisors' "		17 39	
Treasurer's "			
Clerical work at meeting	30 00		
Other clerical work	16 02		
Printing, stationery and postage	51 06		
Carriage of accounts at Annual Meeting	1 70		
Bay State Trust Co., rent of box	10 00		
Am. Surety Co., Treasurer's bond	60 00		
Rubber Stamp	1 00		
	$169 78	169 78	
District Treasurer's Expense :			
Commissions	643 00		
Printing and Postage	179 14		
	$822 14	822 14	
Amounts carried forward,		$2,165 97	$40,255 90

Amounts brought forward,		$2,165 97	$40,255 90
Exchange		1 00	
Salaries		1,400 00	
Rent		750 00	
Annual Dividend		4,500 00	
Shattuck Lecture		200 00	
Cotting Lunch:			
Cigars	$13 50		
Caterer	95 00		
	$108 50	108 50	
Committee to Procure Scientific Papers		10 00	
" on Publications		2,113 08	
" " Diplomas		12 59	
" " Ethics		22 00	
Committee on State and National Legislation:			
A. D. Hill, watching legislation	$100 00		
Subscription to Legislative Bulletin	2 00		
Printing and Postage	134 10		
Reprints	13 10		
	$249 20	249 20	
Committee on By-Laws:			
Printing		42 00	
Committee on Tuberculosis:			
Thomas F. Harrington, incidentals	5 00		
Copies of "Out Door Life"	4 00		
Printing	69 87		
Clerical work	10 50		
Distributing Report	15 00		
	$104 37	104 37	
American Medical Association:			
S. D Presbury, Delegate to Committee on Medical Legislation		78 90	
Annual Meeting:			
Clerical work	44 65		
Engraving	8 25		
Printing and Postage	97 79		
Card Signs	11 95		
Rent of Mechanics Hall	659 00		
Tables, darkening windows and erecting stand	179 48		
Decorating and Flowers	70 00		
Band and Music	60 00		
Police	8 00		
Room at St. Botolph Club and Carriage	2 50		
Carriage	1 50		
Transportation	31 50		
Boston Towel Supply Co.	5 25		
Caterer	2,752 55		
Amounts carried forward,		$11,757 61	$40,255 90

Amounts brought forward,		$11,757 61	$40,255 90
Cigars	$196 50		
Steriopticon	30 00		
Skin Clinic	4 00		
Boston Society for Relief of Tuberculosis	67 52		
Insurance	10 00		
Injury to Microscope	42 75		
Incidentals	34 39		
	$4,317 58	4,317 58	
Overpaid assessments, less commissions		14 50	
Davis Memorial Fund		300 00	
Phillips Fund:			
$10,000 Massachusetts 3½ bonds of 1944	$9,900 00		
Interest	25 28		
	$9,925 28	9,925 28	
Annual Meeting of 1908:			
Printing		24 00	
Total Expenses		$26,338 97	26,338 97
Balance			$13,916 93

At the close of the financial year this balance was distributed as follows:

Deposit in the Bay State Trust Co.	$6,724 66	
" " " New England Trust Co.	7,665 18	
Undrawn interest in Suffolk Savings Bank	37 84	
Check not deposited	10 00	
" " "	19 00	
" " "	1 00	
Total cash on hand	$14,457 68	$14,457 68
Outstanding checks		540 75
Balance		$13,916 93

The $10,000 United States 4 per cent. bond belonging to the Phillips Fund has been redeemed at maturity, and the proceeds have been reinvested in a $10,000 Massachusetts 3½ per cent. bond of 1944. The permanent investments are now as follows:

Deposit in Roxbury Institution for Savings, Cotting Fund	$1,000 00
Deposited in Provident Institution for Savings, Cotting Fund	1,000 00
Deposited in Suffolk Savings Bank, Cotting Fund	1,000 00
" " Franklin " " Permanent Fund	1,074 48
Amount carried forward,	$4,074 48

Amount brought forward,	$4,074	48
Annuity Bond of Massachusetts Hosp. Life Ins. Co., Shattuck Fund	9,166	87
Annuity Bond of Massachusetts Hosp. Life Ins. Co., Permanent Fund	11,253	30
Massachusetts 3½ per cent. bonds, Phillips Fund	10,000	00
" 3½ " " " Permanent Fund	6,000	00
Total	$40,494	65

EDWARD M. BUCKINGHAM,
Treasurer.

The undersigned, a duly appointed committee, having examined the books of the Treasurer, find them correctly cast and properly vouched, and also that he has in his possession the securities called for.

M. V. PIERCE, *Chairman.*
G. RYDER.

Boston, May 11, 1908.

Officers of The Massachusetts Medical Society.

1908—1909.

Chosen June 9, 1908.

Silas D. Presbrey,	Taunton,	President.
Daniel E. Keefe,	Springfield,	Vice-President.
Francis W. Goss,	Roxbury,	Secretary.
Edward M. Buckingham,	Boston,	Treasurer.
Edwin H. Brigham,	Brookline,	Librarian.

Standing Committees.

Of Arrangements.

Lincoln Davis, G. H. Francis,
L. W. Gilbert, A. N. Broughton,
C. C. Simmons, F. C. Kidner.

On Publications.

O. F. Wadsworth, G. B. Shattuck, H. L. Burrell.

On Membership and Finance.

F. W. Goss, Walter Ela, C. M. Green,
A. Coolidge, Jr., Samuel Crowell.

To Procure Scientific Papers.

R. C. Larrabee, Charles Harrington,
Christopher Seymour, E. W. Taylor, F. B. Lund.

On Ethics and Discipline.

Leonard Wheeler, J. A. Gage, J. W. Bartol,
Henry Jackson, G. deN. Hough.

On Medical Diplomas.

H. E. Marion, O. F. Rogers, H. W. Newhall.

On Medical Education.

H. C. Ernst, H. D. Arnold, C. H. Williams.

On State and National Legislation.

S. D. Presbrey, G. G. Sears, D. D. Gilbert,
C. H. Cook, C. F. Withington.

Presidents of District Societies—Vice-Presidents (Ex-Officiis).

[Arranged according to seniority.]

Charles Dutton,	A. P. Perry,
C. P. Putnam,	W. J. Learned,
G. L. Woods,	N. S. Hunting,
W. B. Jackson,	J. W. Cram,
C. E. Prior,	W. W. Miner,
W. G. Reed,	E. Washburn,
F. J. Ripley,	S. P. F. Cook,
C. E. Durant,	J. J. Hassett,
J. G. Henry,	S. H. Sears.

Councillors.

Barnstable.—B. D. Gifford, Chatham; J. H. Higgins, Marston's Mills.

Berkshire.—J. F. A. Adams, H. Colt, Pittsfield; O. J. Brown, H. Bushnell, North Adams.

Bristol North.—A. S. Deane, F. A. Hubbard, S. D. Presbrey, Taunton.

Bristol South.—A. W. Buck, W. A. Dolan, J. H. Gifford, Fall River; C. A. Bonney, G. deN. Hough, C. A. Pratt, New Bedford.

Essex North.—J. F. Burnham, C. G. Carleton, Lawrence; I. J. Clarke, Haverhill; J. A. Douglass, Amesbury; C. P. Morrill, North Andover; J. F. Young, Newburyport; L. J. Young, Haverhill.

Essex South.—C. H. Bangs, Lynn; D. Coggin, Salem; R. T. Glendenning, Manchester; A. N. Greenwood, Marblehead; E. B. Hallett, Gloucester; H. E. Sears, Beverly; J. Shanahan, Peabody; J. E. Simpson, Salem; M. C. Smith, Lynn.

Franklin. — G. P. Twitchell, Greenfield; N. P. Wood, Northfield.

Hampden.—C. A. Allen, D. F. Donoghue, Holyoke; G. E. Fuller, Monson; M. H. Hodgkins, Palmer; G. H. Janes, Westfield; D. E. Keefe, J. E. Marsh, A. O. Squier, W. R. Weiser, Springfield.

Hampshire.—A. M. Belden, Northampton; O. W. Cobb, Easthampton; V. S. Merritt, Haydenville.

Middlesex East.—D. C. Dennett, Winchester; C. W. Harlow, Melrose Highlands; R. D. Perley, Melrose.

Middlesex North.—J. B. Field, W. A. Johnson, J. E. Lamoureux, C. E. Simpson, Lowell; J. H. Nichols, Tewksbury; W. J. Sleeper, Westford.

Middlesex South.—L. B. Clark, Waverley; J. M. Crocker, Cambridge; H. F. Curtis, East Somerville; G. W. Gay, Chestnut Hill; H. E. Marion, Brighton; G. A. Miles, Somerville; J. T. G. Nichols, W. Preble, Cambridge; J. F. O'Brien, Charlestown; L. M. Palmer, South Framingham; C. E. Prior, G. Ryder, Malden; W. S. Richardson, Marlborough; H. S. Rowen, Brighton; F. G. Smith, Somerville; E. P. Stickney, Arlington; I. E. Stowe, Medford; L. R. Stone, Newton; E. H. Stevens, F. W. Taylor, H. P. Walcott, Cambridge; A. Worcester, Waltham.

Norfolk.—B. S. Blanchard, G. H. Francis, L. W. Gilbert, Brookline; M. J. Cronin, C. B. Darling, Roxbury; F. P. Drew, Dedham; C. G. Dewey, D. D. Gilbert, Dorchester; H. T. Holland, G. H. Ingalls, Jamaica Plain; W. W. Howell, West Roxbury; G. N. Jones, Wellesley Hills; C. D. Knowlton, Roxbury; M. V. Pierce, Milton; H. V. Reynolds, Dorchester; T. J. Shanahan, Brookline; T. Smith, Jamaica Plain; H. C. Towle, Dorchester; W. A. White, C. H. Winn, Roxbury; A. M. Worthington, Dedham.

Norfolk South.—E. N. Mayberry, South Weymouth; F. J. Peirce, Quincy; J. W. Spooner, Hingham.

Plymouth.—J. H. Averill, Campello; G. Osgood, Rockland; A. E. Paine, Brockton; F. G. Wheatley, North Abington.

SUFFOLK.—H. D. Arnold, J. B. Ayer, J. B. Blake, E. G. Brackett, E. H. Bradford, E. M. Buckingham, J. F. Bush, A. T. Cabot, A. Coolidge, Jr., F. J. Cotton, W. W. Gannett, C. M. Green, B. J. Jeffries, E. P. Joslin, F. I. Knight, H. A. Lothrop, J. H. McCollom, A. B. Morong, J. G. Mumford, A. H. Nichols, C. B. Porter, W. L. Richardson, T. M. Rotch, G. H. M. Rowe, G. G. Sears, F. C. Shattuck, G. B. Shattuck, A. K. Stone, H. F. Vickery, O. F. Wadsworth, G. H. Washburn, J. C. White, H. Williams, Boston; M. F. Gavin, South Boston; J. M. Putnam, Chelsea.

WORCESTER.—W. P. Bowers, Clinton; J. T. Duggan, O. H. Everett, G. E. Francis, H. Gage, T. H. Gage, R. W. Greene, D. Harrower, Worcester; E. B. Harvey, Westboro'; E. W. Norwood, Spencer; L. Wheeler, S. B. Woodward, Worcester.

WORCESTER NORTH.—C. E. Bigelow, Leominster; E. P. Miller, F. H. Thompson, Fitchburg; E. A. Sawyer, Gardner.

Censors.

BARNSTABLE.—C. M. Baker, C. E. Harris, Hyannis; B. D. Gifford, *Supervisor*, Chatham; E. E. Hawes, Harwich; C. W. Milliken, Barnstable.

BERKSHIRE.—J. F. A. Adams, *Supervisor*, Pittsfield; M. M. Brown, H. Bushnell, North Adams; W. M. Mercer, J. B. Thomas, Pittsfield.

BRISTOL NORTH.—A. R. Crandell, F. A. Hubbard, *Supervisor*, D. J. Mehegan, T. J. Robinson, Taunton; H. S. Kilby, North Attleborough.

BRISTOL SOUTH.—A. I. Connell, W. A. Dolan, *Supervisor*, H. G. Wilbur, Fall River; J. C. Pothier, A. P. Webber, New Bedford.

ESSEX NORTH.—R. M. Birmingham, J. A. Magee, Lawrence; J. A. Fitz-Hugh, Amesbury; F. B. Pierce, L. J. Young, *Supervisor*, Haverhill.

Essex South.—J. A. Bedard, Lynn; H. J. Hall, Marblehead; H. E. Sears, *Supervisor*, Beverly; A. N. Sargent, B. R. Symonds, Salem.

Franklin.—E. G. Best, Turner's Falls; G. A. Cooke, Montague; G. R. Fessenden, Ashfield; C. G. Trow, Sunderland; N. P. Wood, *Supervisor*, Northfield.

Hampden.—A. L. Damon, North Wilbraham; V. J. Irwin, J. E. Marsh, *Supervisor*, F. B. Sweet, Springfield; G. L. Taylor, Holyoke.

Hampshire.—W. H. Adams, A. M. Belden, *Supervisor*, J. C. Fahey, Northampton; N. C. Haskell, Amherst; J. Stowell, North Amherst.

Middlesex East.—D. C. Dennett, *Supervisor*, Winchester; G. F. Dow, E. D. Richmond, Reading; E. C. Fish, Melrose; C. F. McCarthy, Winchester.

Middlesex North.—W. G. Eaton, J. A. Gage, T. G. McGannon, J. V. Meigs, C. E. Simpson, *Supervisor*, Lowell.

Middlesex South.—G. A. Bancroft, South Natick; G. P. Cogswell, Cambridge; J. W. Lawrence, Malden; E. D. Pillsbury, Somerville; H. S. Rowen, *Supervisor*, Brighton.

Norfolk.—C. S. Francis, Brookline; E. T. Galligan, Roxbury; G. H. Ingalls, *Supervisor*, Jamaica Plain; R. M. Merrick, Dorchester; J. W. Pratt, Dedham.

Norfolk South.—H. L. Dearing, Braintree; M. E. Drew, Atlantic; F. C. Granger, Randolph; F. E. Jones, Quincy; E. N. Mayberry, *Supervisor*, South Weymouth.

Plymouth.—A. L. Beals, E. C. Frost, Brockton; N. C. King, Campello; A. A. MacKeen, Whitman; G. Osgood, *Supervisor*, Rockland.

Suffolk.—E. G. Brackett, *Supervisor*, J. N. Coolidge, W. E. Fay, W. F. Gay, C. H. Hare, Boston.

Worcester.—F. H. Baker, R. W. Greene, *Supervisor*, R. P. Watkins, Worcester; F. H. Clapp, North Grafton; J. J. Goodwin, Clinton.

Worcester North.—J. B. Donnelly, West Gardner; E. P. Miller, *Supervisor*, E. J. Tully, Fitchburg; H. W. Page, Baldwinsville; A. H. Pierce, Leominster.

Commissioners of Trials.

Barnstable	J. H. Higgins	Marston's Mills.
Berkshire	A. T. Wakefield	Sheffield.
Bristol North	C. S. Holden	Attleborough.
Bristol South	G. L. Richards	Fall River.
Essex North	J. F. Young	Newburyport.
Essex South	R. E. Bicknell	Swampscott.
Franklin	F. E. Johnson	Erving.
Hampden	L. J. Gibbs	Chicopee Falls.
Hampshire	J. B. Learned	Florence.
Middlesex East	E. S. Jack	Melrose.
Middlesex North	F. E. Varney	North Chelmsford.
Middlesex South	D. E. Baker	Newtonville.
Norfolk	M. V. Pierce	Milton.
Norfolk South	G. W. Tinkham	Weymouth.
Plymouth	C. A. Drew	State Farm.
Suffolk	M. F. Gavin	Boston.
Worcester	E. V. Scribner	Worcester.
Worcester North	L. G. Chandler	Townsend.

Officers of the District Medical Societies.

Barnstable.—S. H. Sears, Yarmouthport, *President;* H. B. Hart, East Dennis, *Vice-President;* J. P. Nickerson, West Harwich, *Secretary;* W. D. Kinney, Osterville, *Treasurer.*

Berkshire.—J. J. Hassett, Lee, *President;* H. B. Holmes, Adams, *Vice-President;* I. S. F. Dodd, Pittsfield, *Secretary;* W. L. Paddock, Pittsfield, *Treasurer.*

Bristol North.—E. Washburn, Taunton, *President;* A. V. Goss, Taunton, *Vice-President;* R. D. Dean, Taunton, *Secretary;* W. Y. Fox, Taunton, *Treasurer.*

Bristol South.—W. T. Learned, Fall River, *President;* A. H. Mandell, New Bedford, *Vice-President;* A. J. Abbe, Fall River, *Secretary and Treasurer.*

Essex North.—C. E. Durant, Haverhill, *President;* W. W. Pillsbury, Newburyport, *Vice-President;* J. F. Burnham, Lawrence, *Secretary and Treasurer.*

Essex South.—S. P. F. Cooke, Gloucester, *President;* F. W. Baldwin, Danvers, *Vice-President;* G. K. Blair, Salem, *Secretary;* G. Z. Goodell, Salem, *Treasurer.*

Franklin.—J. W. Cram, Colrain, *President;* C. L. Upton, Shelburne Falls, *Vice-President;* C. M. Greenough, Greenfield, *Secretary and Treasurer.*

Hampden.—G. L. Woods, Springfield, *President;* C. W. Jackson, Monson, *Vice-President;* R. S. Benner, Springfield, *Secretary and Treasurer.*

Hampshire.—W. W. Miner, Ware, *President;* F. H. Smith, Hadley, *Vice-President;* A. G. Minshall, Northampton, *Secretary;* A. H. Hoadley, Northampton, *Treasurer.*

Middlesex East.—C. Dutton, Wakefield, *President;* Philip Hammond, Winchester, *Vice-President;* F. R. Sims, Melrose, *Secretary;* J. P. Bixby, North Woburn, *Treasurer.*

Middlesex North.—W. B. Jackson, Lowell, *President;* C. A. Viles, Lowell, *Vice-President;* A. R. Gardner, Lowell, *Secretary;* T. B. Smith, Lowell, *Treasurer.*

Middlesex South.—C. E. Prior, Malden, *President;* L. M. Palmer, South Framingham, *Vice-President;* W. L. Bond, Somerville, *Secretary;* W. Ela, Cambridge, *Treasurer.*

Norfolk.—A. P. Perry, Jamaica Plain, *President;* H. M. Cutts, Brookline, *Vice-President;* W. H. Robey, Jr., Roxbury, *Secretary;* G. W. Kaan, Brookline, *Treasurer.*

Norfolk South.—N. S. Hunting, Quincy, *President;* O. H. Howe, Cohasset, *Vice-President;* C. S. Adams, Wollaston, *Secretary and Treasurer.*

Plymouth.—F. J. Ripley, Brockton, *President;* C. S. Millet, Brockton, *Vice-President;* A. C. Smith, Brockton, *Secretary and Treasurer.*

SUFFOLK.—C. P. Putnam, Boston, *President;* G. H. Monks, Boston, *Vice-President;* L. R. G. Crandon, Boston, *Secretary;* W. H. Prescott, Boston, *Treasurer.*

WORCESTER.—W. G. Reed, Southbridge, *President;* L. F. Woodward, Worcester, *Vice-President;* G. E. Emery, Worcester, *Secretary;* G. O. Ward, Worcester, *Treasurer.*

WORCESTER NORTH.—J. G. Henry, Winchendon, *President;* E. L. Fiske, Fitchburg, *Vice-President;* W. F. Sawyer, Fitchburg, *Secretary;* E. L. Fiske, Fitchburg, *Treasurer.*

The Massachusetts Medical Society.

PROCEEDINGS OF THE COUNCIL.

October 7, 1908.

A Stated Meeting of the Council was held in the Medical Library, Boston, on Wednesday, October 7, 1908, at 12, noon.

The President, Dr. Silas D. Presbrey, in the chair.

The following Councillors were present:

Bristol North.
F. A. Hubbard,
S. D. Presbrey.

Bristol South.
A. W. Buck,
J. H. Gifford.

Essex North.
J. F. Burnham,
C. G. Carleton,
J. A. Douglass,
C. P. Morrill,
J. F. Young.

Essex South.
C. H. Bangs,
D. Coggin,
R. T. Glendenning,
E. B. Hallett,
H. E. Sears.

Franklin.
G. P. Twitchell.

Hampden.
M. B. Hodskins,
D. E. Keefe.

Middlesex South.
J. M. Crocker,
H. F. Curtis,
G. W. Gay,
H. E. Marion,
G. A. Miles,
J. F. O'Brien,
W. Preble,
C. E. Prior,
H. S. Rowen,
G. Ryder,
F. G. Smith,
L. R. Stone,
I. E. Stowe,
F. W. Taylor,
A. Worcester.

Norfolk.
M. J. Cronin,
C. B. Darling,
F. P. Drew,
G. H. Francis,
D. D. Gilbert,
H. T. Holland,
W. W. Howell,
G. N. Jones,
C. D. Knowlton,
H. V. Reynolds,
T. J. Shanahan,
T. Smith.

Norfolk South.
J. W. Spooner.

Plymouth.
J. H. Averill,
G. Osgood,
A. E. Paine,
F. G. Wheatley.

Suffolk.
E. M. Buckingham,
J. F. Bush,
A. T. Cabot,
C. M. Green,
A. B. Morong,
A. H. Nichols,
W. L. Richardson,
T. M. Rotch,
G. G. Sears,
F. C. Shattuck,
G. B. Shattuck,
H. F. Vickery,
O. F. Wadsworth,
J. C. White.

Worcester.
O. H. Everett,
G. E. Francis,
H. Gage,
S. B. Woodward.

Worcester North.
E. A. Sawyer,
F. H. Thompson.

Total, 69

The record of the last meeting was read and accepted.

The following were appointed Delegates to other State Medical Societies:

Vermont.—A. V. Goss, of Taunton; B. P. Croft, of Greenfield.

New York.—S. B. Woodward, of Worcester; C. A. Allen, of Holyoke.

The Committee on Membership and Finance reported, and in accordance with their recommendation it was voted that the resignations of the following be accepted:

John E. Belding, of Toledo, Ohio.
Albert P. Duryee, of Everett, Wash.
Ralph R. Fitch, of Rochester, N. Y.
Henry G. Langworthy, of Dubuque, Iowa.
Thomas A. Storey, of New York, N. Y.
John A. Whittle, of Rochester, N. Y.

Also, that the following be placed on the retired list:

William Bass, of Lowell.
Marshall L. Brown, of Allston.
David Clark, of Springfield.
Theodore W. Fisher, of Boston.
George C. Howard, of Lawrence.
Edward D. Hutchinson, of Westfield.
Calvin Pratt, of Bridgewater.
Christopher Seymour, of Northampton.
Joseph R. Webster, of Cambridge.

Also, that the following be deprived of the privileges of fellowship for non-payment of dues:

Clarence F. Ball, of Rutland, Vt.
Michael H. Chrystal, of Ayer.
Franklin E. Clark, of Allston.
George W. Clarke, of Roseville, Ill.
Charles H. Cogswell, of Boston.
Richard Coulson, of Somerville.
John E. Dalton, of Warren.
George H. Davis, of Springfield.
Mary P. Dole, of New Haven, Conn.
Louis C. Gobron, of Roxbury.
George E. Goodwin, of Berwick, Me.
Willis Le B. Hale, of Attleborough Falls.
Alice L. Hirshberg, of Allston.

Clarence E. Howland, of North Dartmouth.
Theron H. Huckins, of Tilton, N. H.
David Hunt, of Cleveland, Ohio.
Alice M. Jackman, of Chestnut Hill.
Francis J. Keleher, of Dorchester.
Otis H. Kelsey, of Denver, Colo.
Abraham Koplowitz, of Boston.
Andrew J. Mackay (residence unknown).
John R. McKenzie, of Cambridge.
James S. McLaughlin, of Westfield.
Willis B. McMichael, of East Boston.
James Moriarty (residence unknown).
Nathaniel M. Morse, of New York, N. Y.
Arthur B. Moulton, of Harrisburg, Pa.
Edward F. Murray, of Burlington, Vt.
Rees B. Rees, of South Boston.
Frank R. Rix, of Flushing, N. Y.
Frank M. Robertson, of Bristol, N. H.
John J. Sewall, of Newport, Me.
James H. Shannon, of Washington, Pa.
John P. Shine, of Holyoke.
William H. Shisler, of Boston.
Calvin Weidner, of Manchester, Conn.
Francis J. Weller, of South Boston.
Arthur F. Wheat, of Manchester, N. H.
John D. Yost, U. S. Army.

The same Committee to whom was referred the petition of a member to be reinstated who had resigned, reported—

That the question had arisen whether one whose resignation had been accepted can be reinstated by vote of the Council. The opinion of legal counsel had been obtained, which was in substance that the statutes of the Commonwealth relating to the Society are explicit, that no person can become a member of the Society *except upon an examination by the Censors.* This cannot be departed from by the Society, and it would clearly apply to the case of a former member. Though this is so, there is no statement in the statute as to what the examination should be, and no requirement that it should be exactly the same in all cases. The statute requires that the Censors should really pass upon the merits of the application, and a purely *pro forma* examination would hardly be sufficient. While the by-laws (see by-law 15) do require the Censors to employ a uniform plan devised by the Supervisors, it is not necessary that this plan should be exactly the same in every class of cases. For instance, in the plan adopted by the Supervisors the Censors are authorized to make a certain relaxation in

the case of persons who have been in the successful practice of medicine for a period of years, etc.; and there seems to be no reason why the Supervisors should not adopt a rule that where a man had once been admitted as a member, he should not be reëxamined if the Board of Censors were of the opinion, after talking with him and a reasonable inquiry, that his qualifications were sufficient.

In view of this opinion the Committee advised the Council to recommend to the Board of Supervisors that in the case of those whose resignation from the Society had been accepted, and who apply for reinstatement, the Censors shall satisfy themselves by oral examination that such applicants still possess proper qualifications for membership in the Society.

Voted, To accept the report of the Committee and adopt its recommendation.

Voted, That Dr. T. J. Robinson, of Taunton, be appointed a member of the Committee to Procure Scientific Papers, to fill the vacancy caused by the death of Dr. Charles Harrington.

Voted, That Dr. G. W. Gay be appointed to fill a vacancy in the Committee on State and National Legislation caused by the resignation of Dr. G. G. Sears.

Voted, That F. M. Spalding be appointed to fill the vacancy in the Committee on Ophthalmia Neonatorum caused by the resignation of Dr. E. T. Easton.

Voted, That Dr. John Joseph Martin, of Beverly, be restored to the privileges of membership.

On motion of Dr. Gay it was voted that the date of the next annual meeting of the Society be changed to June 15 and 16, 1909, that it may not conflict with the meeting of the American Medical Association.

Adjourned at 1 P.M.

FRANCIS W. GOSS,
Secretary.

FEBRUARY 3, 1909.

A STATED MEETING of the Council was held in the Medical Library, Boston, on Wednesday, February 3, 1909, at 12, noon.

The President, Dr. SILAS D. PRESBREY, in the chair.

The following Councillors were present:

Bristol North.
A. S. Deane,
S. D. Presbrey.

Bristol South.
A. W. Buck,
J. H. Gifford,
G. deN. Hough.

Essex North.
J. F. Burnham,
C. G. Carleton,
J. A. Douglass,
C. P. Morrill.

Essex South.
C. H. Bangs,
R. T. Glendenning,
H. E. Sears,
J. Shanahan,
M. C. Smith.

Hampden.
M. B. Hodskins.

Middlesex East.
D. C. Dennett,
C. W. Harlow,
R. D. Perley.

Middlesex South.
L. B. Clark,
J. M. Crocker,
H. F. Curtis,
G. W. Gay,
H. E. Marion,
G. A. Miles,
L. M. Palmer,
W. Preble,
H. S. Rowen,
G. Ryder,
E. H. Stevens,
L. R. Stone,
I. E. Stowe,
F. W. Taylor,
A. Worcester.

Norfolk.
B. S. Blanchard,
M. J. Cronin,
C. B. Darling,
F. P. Drew,
G. H. Francis,
L. W. Gilbert,
W. W. Howell,
C. D. Knowlton,
M. V. Pierce,
H. V. Reynolds,
T. J. Shanahan,
T. Smith,
W. A. White.

Norfolk South.
E. N. Mayberry,
J. W. Spooner.

Plymouth.
J. H. Averill,
G. Osgood,
A. E. Paine.

Suffolk.
H. D. Arnold,
J. B. Ayer,
J. B. Blake,
E. H. Bradford,
J. F. Bush,
A. T. Cabot,
F. J. Cotton,
A. B. Morong,
J. G. Mumford,
A. H. Nichols,
W. L. Richardson,
T. M. Rotch,
G. G. Sears,
F. C. Shattuck,
G. B. Shattuck,
O. F. Wadsworth,
G. H. Washburn,
J. C. White,
H. Williams.

Worcester.
W. P. Bowers,
O. H. Everett,
H. Gage,
R. W. Greene,
D. Harrower,
E. B. Harvey,
E. W. Norwood,
L. Wheeler,
S. B. Woodward.

Worcester North.
C. E. Bigelow,
E. P. Miller,
F. H. Thompson.

Total, 82.

The record of the last meeting was read and accepted.

The following were appointed Delegates to other Medical Societies:

American Medical Association, 1909 and 1910.—J. L. Morse, Boston; R. P. M. Ames, Springfield; C. E. Durant, Haverhill.

Alternates.—C. F. Canedy, Greenfield; J. B. Donnelly, West Gardner; F. J. Ripley, Brockton.

Maine.—Leonard Huntress, Lowell; J. F. Croston, Haverhill.

New Hampshire.—B. W. Baker, Taunton; Charles Dutton, Wakefield.

Rhode Island.—Florence H. Abbott, Worcester; G. deN. Hough, New Bedford.

Connecticut.—Henry Colt, Pittsfield; A. W. Buck, Fall River.

New Jersey.—J. M. Fay, Northampton; A. L. Norris, Cambridge.

The following Committee was appointed:

To Audit the Treasurer's Accounts.—Godfrey Ryder, H. S. Kilby.

The Committee on Membership and Finance reported, and in accordance with their recommendation it was voted that the resignations of the following be accepted:

Frederick L. Brush, of New York, N. Y.
Henry (Harry) A. Cotton, of Trenton, N. J.
Joseph D. Weis, of New Orleans, La.

Also, that the following be placed on the retired list:

Thomas Dwight, of Nahant.
George S. Eddy, of Fall River.
George E. Francis, of Worcester.
John L. Hildreth, of Cambridge.
John T. G. Nichols, of Cambridge.
Thomas P. Shaw, of Lowell.

Dr. Wadsworth, for the Committee appointed to consider what measures should be taken by the Society to prevent the occurrence and secure the prompt and effective treatment of Ophthalmia Neonatorum, reported that it had considered the question and prepared a circular. In its opinion it would be for the advantage of the community and of the Society that the circular be distributed; and it recommended that it be given authority to distribute the circular to each member of the Society and to furnish

extra copies, so that members may, in their discretion, give them to nurses and patients.

Voted to accept the report, and adopt its recommendation.

Voted, That the following be restored to the privileges of membership:

Willard Henry Pierce, of Greenfield.
Richard Wynne, of Brookline.

Voted, On recommendation of the Committee on Contract Work:

Whereas, the subject of Contract Work appears upon investigation to involve many questions affecting not only the individual rights of members, but also the future interests and welfare of The Massachusetts Medical Society; therefore your Committee recommend that the whole subject be referred to an enlarged committee for full investigation and discussion before taking action thereon.

Voted, That the subject be referred to a Committee of five.

The following were appointed to constitute the Committee:

W. A. Dolan, Fall River: J. A. Gage, Lowell; C. E. Durant, Haverhill; A. E. Paine, Brockton; J. W. Spooner, Hingham.

Attention was called to the vacancy in the Committee On State and National Legislation caused by the death of Dr. Gilbert.

Voted, That Dr. F. G. Wheatley be appointed to fill the vacancy.

A circular from the Committee on the Pharmacopœia, American Medical Association, was read, calling attention to the Convention of the U. S. Pharmacopœial Revision in 1910, and requesting organizations entitled to representation therein to take action by committees or otherwise on various questions.

Voted, That the subject be referred to the following as a Committee:

F. G. Wheatley, W. P. Bolles, M. V. Tyrode.

Adjourned at 12.45 P.M.

FRANCIS W. GOSS,
Secretary.

JUNE 15, 1909.

THE ANNUAL MEETING of the Council was held in the Medical Library, Boston, on Tuesday, June 15, 1909, at 5 P.M.

The President, Dr. SILAS D. PRESBREY, in the chair.

The following Councillors were present:

Barnstable.
E. E. Hawes.

Berkshire.
O. J. Brown.

Bristol North.
F. A. Hubbard,
S. D. Presbrey,
E. Washburn.

Bristol South.
W. A. Dolan,
J. H. Gifford,
G. deN. Hough,
H. G. Wilbur.

Essex North.
J. F. Burnham,
I. J. Clarke,
J. A. Douglass,
E. H. Noyes,
F. W. Snow,
L. J. Young.

Essex South.
R. E. Bicknell,
H. C. Boutelle,
D. J. Finegan,
J. F. Jordan,
H. T. Penny.

Franklin.
G. P. Twitchell.

Hampden.
R. P. M. Ames,
L. J. Gibbs,
V. J. Irwin,
D. E. Keefe.

Hampshire.
J. S. Hitchcock.

Middlesex East.
C. J. Allen,
C. Dutton,
A. C. Lane.

Middlesex North.
W. B. Jackson,
J. E. Lamoureux,
G. H. A. Leahey,
C. E. Simpson.

Middlesex South.
G. A. Bancroft,
H. F. Curtis,
J. A. Dow,
G. W. Gay,
J. F. O'Brien,
C. E. Prior,
F. W. Rice,
G. Ryder,
F. G. Smith,
E. H. Stevens,
E. P. Stickney,
F. W. Taylor,
H. S. Trueman,
G. L. West,
A. Worcester.

Norfolk.
E. H. Baxter,
B. S. Blanchard,
S. Crowell,
C. B. Darling,
L. W. Gilbert,
H. T. Holland,
G. H. Ingalls,
G. N. Jones,
E. B. Lane,
H. V. Reynolds,
T. J. Shanahan,
H. F. R. Watts,
W. A. White,
A. G. Williams.

Norfolk South.
F. E. Jones,
J. W. Spooner.

Plymouth.
N. K. Noyes,
A. E. Paine,
F. G. Wheatley.

Suffolk.
H. D. Arnold,
E. M. Buckingham,
A. T. Cabot,
A. Coolidge, Jr.,
F. J. Cotton,
E. G. Cutler,
C. M. Green,
J. H. McCollom,
A. B. Morong,
A. H. Nichols,
W. L. Richardson,
G. H. M. Rowe,
J. D. K. Sabine,
G. G. Sears,
F. C. Shattuck,
G. B. Shattuck,

A. K. Stone,
H. F. Vickery,
O. F. Wadsworth,
G. H. Washburn.

Worcester.

W. P. Bowers,
J. T. Duggan,
O. H. Everett,
R. W. Greene,
D. Harrower,
E. B. Harvey,
E. W. Norwood,
L. Wheeler,
S. B. Woodward.

Worcester North.

C. E. Bigelow,
E. P. Miller,
E. A. Sawyer.

Total, 99.

The record of the last meeting was read and accepted.

The President read a letter from Dr. Goss, declining to be a candidate for reëlection to the office of Secretary.

On motion of Dr. F. W. Taylor, the following was unanimously voted and ordered to be placed in the records:

"In view of the thirty-four years of service rendered to The Massachusetts Medical Society by the retiring Secretary, Francis Webster Goss, the Council wishes to express its appreciation of his work.

Dr. Goss has served the Society not only long, but also intelligently and faithfully. His careful and punctual attention to the details of his office has expedited the meetings of the Council and facilitated the work of its Committees. His knowledge of and loyalty to the traditions and aims of the Society have made him a valuable adviser and guide.

The Council hereby acknowledges its obligations, and expresses its gratitude to him."

The Treasurer, Dr. BUCKINGHAM, read his annual report.

The Auditing Committee reported that they found the accounts correctly cast and properly vouched, and that the Treasurer has in his possession the securities called for.

Voted, To accept the Treasurer's report.

The Committee on Membership and Finance reported through Dr. Goss, recommending that $4,500.00 of the surplus in the treasury be distributed among the District Societies.

Voted, That the recommendation be adopted.

In accordance with the recommendation of the same Committee it was voted, that the resignations of the following be accepted:

Fanny Berlin, of Roxbury.
Helen L. Betts, of Pacific Grove, Cal.
William H. Connor, of Pittsfield.
Carl C. Crane, of Norwood.

Joseph H. Derrick, of Los Angeles, Cal.
Arnold F. Furrer, of Cleveland, Ohio.
Donald R. Gilfillan, of Brownlee, Canada.
Stuart V. R. Hooker, of Seattle, Wash.
Lucinda S. Lovell, of Cavendish, Vt.
John S. McQuaid, of Monson.
L. J. Adolph Mignault, of Montreal, Canada.
Charles A. Murray, of Havana, Cuba.
Luther O. Whitman, of San Antonio, Texas.
Herbert L. York, of Dorchester.

Also that the following be placed on the retired list:

Charles A. Bemis, of West Medway.
William E. Boardman, of Boston.
James B. Brewster, of Plymouth.
Charles H. Cobb, of Roslindale.
John B. Learned, of Florence.
Charles B. Sanders, of Lowell.
Samuel W. Torrey, of Beverly.

The Committee on Publications reported through Dr. Wadsworth.

Dr. Ernst, for the Committee on Medical Education, reported that the principal work of the Committee during the last year has been the attendance at the meeting of the Council on Medical Education of the American Medical Association. At that meeting the matter of a medical curriculum was reported upon by a Committee of One Hundred appointed in the preceding year. This Committee considered the question of a curriculum for medical schools under ten different heads, and recommended a curriculum aggregating 4,100 hours.

These figures were voted to represent the maximum requirements covering four years of 32 weeks each of actual work. It represented the results of a study by over one hundred leading medical educators.

The principal interest connected with this action of the Council lay in its decision as to whether the curriculum should be adopted as a requirement. Great danger lies in any fixed curriculum, for it is impossible that all medical schools should be brought under fixed rules. Yet there seems to be no question that this curriculum will be acknowledged as a standard by some State Boards of Registration in Medicine, while a first-class medical school might not think it wise to adopt the fixed number of hours mentioned therein; and students graduating from such schools wishing to appear before certain Boards for registration would have to make up the required number of hours.

The fact that the Board of Registration in Medicine in Massachusetts had introduced in its examination the beginning of a practical test was emphasized by the Delegate of the Committee present at the Council on Medical Education. This beginning is the first that has been made, and the Committee feels that the Council of this Society should support the Board in any further movement in this direction.

Voted to accept the report.

Dr. Gay, for the Committee on State and National Legislation, reported their efforts, which were in most cases successful, in opposing legislative bills against vaccination, animal experimentation, for the licensing of osteopaths, the optometry bill, the combining of the boards of registration in medicine, pharmacy, dentistry and veterinary medicine, and others. All legislation pertaining to the public health opposed by the Committee failed of being enacted. The work of the Committee during the past year has been more extensive and exacting than ever before. The Committee appealed to members of the Society throughout the State to do active work in the legislative matters relating to professional interests.

Voted, That the report be accepted.

Dr. Wheatley, for the Committee appointed to consider matters pertaining to the revision of the United States Pharmacopœia, reported, recommending that a circular be sent to the Fellows of the Society containing all the drugs in the Pharmacopœia and the following requests:

I. Mark in the enclosed list all drugs which you personally use in your practice or believe should appear in the Pharmacopœia.

II. Give the names of any drugs not in the Pharmacopœia which you use and believe should be introduced.

It was further recommended that a sum of money not exceeding $150.00 be appropriated to print and distribute the circular.

Voted to accept the report and adopt its recommendations.

Dr. Cook, the representative of the Society to the National Legislative Council of the American Medical Association, reported on the meeting January 18–20, 1909. He referred to various laws on matters of professional interest in several States. The Bureau of Medical Legislation of the Association is endeavoring to secure and preserve copies of all State laws and of court decisions of interest to the medical profession, to be at its service. Reference was made to Mr. Allen's address, which emphasized the need of uniform State laws on food adulteration, and of the aid of the profession to those who are endeavoring to keep particular interests from getting concessions into the Pharmacopœia.

Dr. Dolan, for the Committee on Medical Contract work, presented a report which described at length the evils of the matter and offered amendments to the by-laws making applicants for membership in the Society who are engaged in such work ineligible to membership, and forbidding members to continue to do contract work. A motion to adopt the report was followed by an animated discussion, during which a minority report by Dr. Gage was called for, which advocated instead of forbidding members to engage in contract work that the Society appoint a committee to call a conference with the State leaders of the fraternal orders and lodges and demand that an equitable basis be established for adjusting matters relating to the question.

An amendment was offered to substitute the minority for the majority report, which was adopted, and it was voted to postpone further consideration of the matter to the next meeting of the Council.

The Librarian, Dr. BRIGHAM, presented his annual report.

The Committee on Nominations reported a list of candidates for the offices of the Society for the ensuing year, and the same were elected by ballot:

President . .	SILAS D. PRESBREY, of Taunton.
Vice-President . .	JOSEPH G. PINKHAM, of Lynn.
Secretary . .	WALTER L. BURRAGE, of Boston.
Treasurer . .	EDWARD M. BUCKINGHAM, of Boston.
Librarian . .	EDWIN H. BRIGHAM, of Brookline.

JOHN C. MUNRO, of Boston, was chosen Orator for the annual meeting of the Society in 1910.

The following Standing Committees were appointed:

Of Arrangements.

L. W. Gilbert, A. N. Broughton,
C. C. Simmons, F. C. Kidner,
G. H. Francis, David Townsend.

On Publications.

O. F. Wadsworth, G. B. Shattuck, H. L. Burrell.

On Membership and Finance.

F. W. Goss, Walter Ela, C. M. Green,
A. Coolidge, Jr. Samuel Crowell.

To Procure Scientific Papers.

Christopher Seymour, E. W. Taylor, F. B. Lund,
T. J. Robinson, F. P. Denny.

On Ethics and Discipline.

Leonard Wheeler, J. A. Gage, J. W. Bartol,
Henry Jackson, G. deN. Hough.

On Medical Diplomas.

H. E. Marion, O. F. Rogers, H. W. Newhall.

On Medical Education.

H. C. Ernst, H. D. Arnold, C. H. Williams.

On State and National Legislation.

S. D. Presbrey, C. H. Cook, C. F. Withington,
G. W. Gay, F. G. Wheatley.

A request from the President of the Convention for the Revision of the U. S. Pharmacopœia, to be held in May, 1910, asking for the appointment of three delegates thereto, was presented.

Voted, That Drs. F. G. Wheatley, W. P. Bolles and M. V. Tyrode, be appointed delegates.

Voted, That Robert Swan Fletcher, of Oxford, be restored to the privileges of membership.

Voted, That the salary of the Secretary be increased to $800.00 per annum.

Voted, on motion of Dr. Cabot, that $400.00 be appropriated for the use, during the coming year, of the Committee on Tuberculosis.

Adjourned at 7.15 P.M.

FRANCIS W. GOSS,
Secretary.

The Massachusetts Medical Society.

PROCEEDINGS OF THE SOCIETY.

ANNUAL MEETING.

First Day.

June 15, 1909.

Sectional meetings were held in the Medical Library, Boston, on Tuesday, June 15, 1909, at 2 P.M.

The Sections were organized and papers were presented as follows:

SECTION IN SURGERY.

Dr. D. E. Keefe, Springfield . . . . . Chairman.
Dr. F. B. Lund, Boston . . . . . Secretary.

The Relation of the Pathological Processes to Clinical Symptoms in Arthritis Deformans.—By Dr. E. H. Nichols, of Boston.

The Diagnosis of Ulcer of the Duodenum.—By Dr. E. A. Codman, of Boston.

The Localization of Pain, Tenderness and Hyperalgesia in the Diagnosis of Some Common Abdominal Diseases.—By Dr. G. deN. Hough of New Bedford.

Acute Dilatation of the Stomach following Surgical Operations.—By Dr. H. B. Smith, of Boston.

SECTION IN MEDICINE.

Dr. R. W. Greene, Worcester . . . . . Chairman.
Dr. E. W. Taylor, Boston . . . . . Secretary.

The Serum Diagnosis of Syphilis.—By Dr. F. P. Gay, of Boston.

The Intravenous Use of Strophanthin in Broken Cardiac Compensation.—By Dr. A. K. Stone, of Boston.

Laboratory Work by the Country Physician.—By Dr. M. A. Cummings, of Winchester.

A Practical Diet Chart.—By Dr. H. D. Arnold, of Boston.

SECTION ON TUBERCULOSIS.

Dr. A. T. Cabot, Boston . . . . . Chairman.
Dr. T. F. Harrington, Boston . . . . . Secretary.

Report of Work Accomplished in Massachusetts during the Past Year.—By Dr. A. T. Cabot, of Boston.

Report of Committee to Suggest Suitable Employment for the Cured Cases of Tuberculosis.—By Dr. Alfred Worcester, of Waltham.

A Tuberculosis Program for Small Cities and Towns.—By Dr. Carl A. Allen, of Holyoke.

Some Frequently Neglected Points in the Diagnosis of Tuberculosis.—By Dr. Cleaveland Floyd, of Brookline.

At 8 P.M. the Shattuck Lecture was delivered by Edward W. Taylor, M.D., of Boston.

Following the lecture a reception was given to the President by the Society.

Second Day.

June 16, 1909.

The Society met in Potter Hall, Boston, on Wednesday, June 16, 1909, at 9.30 A.M., for the exercises of the hundred and twenty-eighth Anniversary.

The President, Dr. Silas D. Presbrey, in the chair.

The record of the last annual meeting was read and accepted.

The Secretary announced that 153 Fellows had been admitted during the past year and that 42 deaths had been recorded.

The following are the lists:

Admissions reported from June 10, 1908, to June 16, 1909.

1908	Atchison, Charles Moran	Fall River.
1908	Barker, Williston Wright	Dorchester.
1908	Barrows, Sterling	Amherst.
1908	Barry, James Henry	Roxbury.
1908	Beaulieu, Elmer Joseph	Whitman.
1908	Berry, Gordon	Worcester.
1909	Birnie, John Mathews	Springfield.
1908	Blood, George Willard	Fall River.
1909	Brant, Austin	Boston.
1909	Brearton, Edward John	Dorchester.
1908	Broderick, Frank Patrick	Jamaica Plain.
1909	Brown, William James	Boston.
1909	Bryant, Mason David	Lowell.
1909	Burlingham, Louis Herbert	Boston.
1908	Cahill, Thomas Joseph	Cambridge.
1908	Callahan, Henry Alphonsus	Jamaica Plain.
1908	Callender, George Russell	Boston.
1909	Canfield, William Chase	West Newton.
1909	Carey, Bernard William	Fitchburg.
1908	Carlton, Frank Carr	Salem.
1909	Carr, Gladys Lydia	Malden.
1909	Carroll, Charles Curtis	Dorchester.
1908	Chalmers, Robert	Woburn.
1908	Chase, Charles Otis	Watertown.
1908	Chase, Gilman Leeds	Clinton.
1909	Chase, Heman Baker	Lawrence.
1908	Christiernin, Charles Leonard	East Boston.
1908	Cleaves, Helen Taft	Medfield.
1908	Collins, William Morris	Lowell.
1909	Conlin, Robert Emmett	Woburn.
1909	Crane, Clarence	Boston.
1908	Creeley, Oscar Slade	Watertown.
1909	Crittenden, George Alanson	Springfield.
1909	Dalton, George Frederick	Springfield.
1908	Darling, Arthur Edwin	Lynn.
1908	Dearborn, Henry Follansby	Lawrence.
1909	Denning, Frederic Joseph	South Boston.
1908	Derrick, Joseph Stephen	Los Angeles, Cal.
1908	Donnell, Herbert Anthony	Boston.
1909	Dorion, Kinton	Lawrence.
1908	Ducy, William Dwyer	Brockton.
1909	Emery, William Campbell	Dorchester.
1908	Eveleth, Samuel Chester	New Bedford.

1909	Foss, Ralph Emery	Peabody.
1909	Fuller, Andrew Howard	Wales.
1908	Geary, Cornelius Edward	Fitchburg.
1908	George, Frank William	Worcester.
1908	George, Leslie Handlin	North Andover.
1908	Gibbs, Howard Augustine	Northampton.
1909	Haines, Edgar Fremont	Danvers.
1908	Ham, Helen Willard	Brockton.
1908	Hamilton, Albert John Adams	South Boston.
1908	Harmer, Torr Wagner	Somerville.
1908	Harris, Lorne Wilborne	Malden.
1909	Hennessey, William Warren	Salem.
1908	Hills, Frederick Lyman	Rutland.
1908	Hirsch, Henry Leon	Springfield.
1909	Hoole, John Edward	West Somerville.
1908	Howe, George Plummer	Lawrence.
1908	Howland, George Lewis	Boston.
1908	Huntington, James Lincoln	Brookline.
1909	Hutchins, Henry Talbot	Boston.
1909	Janes, Benjamin Franklin, Jr.	Springfield.
1908	Johnson, John Birger Albert	Lowell.
1909	Kennison, Frederick Marshman	Holbrook.
1908	Kilbourn, Arthur Goss	Groton.
1908	Kinnicutt, Roger	Worcester.
1908	Knowlton, Roscoe Hosmer	Lowell.
1909	LeBoeuf, Alfred Thomas	Salem.
1908	Leslie, Charles Thomas	Pittsfield.
1909	Liverpool, Coval Henry	West Somerville.
1908	Luce, Dean Sherwood	Canton.
1909	Lupien, Henry John	Boston.
1908	Lynch, Daniel Lawrence	Roslindale.
1908	McCarthy, Eugene Ambrose	Fall River.
1908	McClusky, Henry Lincoln	Worcester.
1908	McCormack, John Sears	Jamaica Plain.
1908	MacDonald, William Campbell	Malden.
1909	McKallagat, Peter Leo	Lawrence.
1909	McQuade, Lewis Steele	Dorchester.
1908	Mace, Charles Herbert	Huntington.
1908	Mann, William Orris	Boston.
1908	Mannix, Louis Edward	Chicopee Falls.
1908	Marshall, William Reginald	Lynn.
1909	Marston, Henry Edward	Salem.
1909	Miles, Charles Gardner	State Farm.
1909	Miller, Percy Farrington	Harwich.
1908	Mixter, Charles Galloupe	Boston.
1908	Moore, John Francis	Worcester.
1908	Morrison, Robert Francis	Holyoke.

1909	Mudge, Otis Pope	Amesbury.
1908	Mullen, Peter James	Amesbury.
1908	Myers, Edmund	Allston.
1909	Myerson, Abraham	Roxbury.
1909	Mysel, Hyman Abraham	Haverhill.
1908	Neally, Willis Grafton	Boston.
1908	Nettle, Paul	Haverhill.
1908	Newhall, Albert Warren	Stoneham.
1908	Noyes, John Russell	Brockton.
1909	Nutter, Roy Bartlett	Boston.
1908	O'Keefe, Abbie Mabel	Roxbury.
1908	Pelletier, Alfred George	Winchendon.
1909	Perry, Sherman	Worcester.
1909	Pettey, John Anderson	Brockton.
1908	Pierce-Higgins, Eudora	Taunton.
1909	Pillsbury, Fitzroy Farnsworth	Lowell.
1908	Pond, Lucius Beverly	Easthampton.
1909	Poole, Laurence Earl	West Gardner.
1908	Powell, Maud Agatha	Boston.
1908	Pratt, David Damon	New Bedford.
1908	Pratt, Mason Ross	Worcester.
1908	Prenn, Joseph	Boston.
1909	Quest, James Francis	Adams.
1908	Reed, Lucy Carleton	Worcester.
1908	Rice, Grace Elizabeth Barnard	Northampton.
1908	Rice, Herbert Augustus	Antrim, N. H.
1908	Roche, Thomas Neil	Boston.
1909	Rogers, Edmund Augustus	Brookline.
1908	Rubin, Solomon Hyman	Boston.
1909	Sanborn, Byron	Topsfield.
1909	Sanders, Orren Burnham	Boston.
1909	Sandler, Samuel	Haverhill.
1908	Savignac, Arthur Noël	Amesbury.
1908	Sawyer, Earle Dewey	Boston.
1908	Senesac, Archibald Napoleon	New Bedford.
1908	Shattuck, George Cheever	Boston.
1909	Shaw, John William	Newburyport.
1909	Sheahan, George Maurice	Quincy.
1908	Smalley, Fred Lyman	Reading.
1908	Smith, Richard Mason	Boston.
1908	Sobotky, Irving	Roxbury.
1909	Spooner, Lesley Hinckley	Boston.
1908	Stack, John Joseph	Melrose.
1908	Stanwood, Frederic Arthur	Boston.
1909	Stewart, Vernon Champney	Woburn.
1909	Stone, Thomas Newcomb	Haverhill.
1909	Sullivan, Martin George	Winchendon.

1908	Swan, Lawrence Clark	New Bedford.
1909	Taylor, Roy Arnold	Waltham.
1908	Taylor, Walter	Northampton.
1908	Teahan, William	Holyoke.
1908	Tighe, Michael Aloysius	Lowell.
1908	Tucker, George Everett	Salem.
1909	Warren, Hobart Endicott	Ashburnham.
1909	Warren, John	Boston.
1908	Webb, Harold Randall	Arlington.
1908	Wheeler, Charles Holmes	Haydenville.
1909	White, Lucy Nye	Boston.
1909	Wilkins, Samuel Henry	Lawrence.
1908	Winslow, Benjamin Sabert	New Bedford.
1909	Worthing, Frank Bertelle	Chatham.
1909	Wurtele, Frederic Josias	Pittsfield.
1908	Young, Walter Harding	Boston.

Total, 153.

List of Deceased Fellows.

Admitted.	Name.	Residence.	Date of Death.	Age.
1859	Allen, Justin	Topsfield	Nov. 5, 1908	82
1903	Baker, George Lorimer	Dorchester	March 18, 1909	35
1878	Brown, John Peaslee	Taunton	Sept. 19, 1908	74
1879	Brown, Roscoe Ellsworth	Everett	Jan. 7, 1909	57
1883	Burr, Charles Henry	New York, N.Y.	Aug. 12, 1908	53
1880	Clark, Walter Thomas	Worcester	Sept. 24, 1908	46
1892	Cooper, Hermon	Amesbury	Nov. 10, 1908	49
1900	Cummings, Frederic Russell	Concord, N. H.	Aug. 8, 1908	35
1872	Cutler, William Bullard	Boston	March 5, 1909	63
1862	Dearing, Thomas Haven	Braintree	Oct. 15, 1908	83
1869	Draper, Frank Winthrop	Brookline	April 19, 1909	66
1858	Ferguson, Hugh	South Boston	June 13, 1909	73
1873	Fessenden, Joseph Palmer	Salem	March 26, 1909	77
1848	Francis, Tappan Eustis	Brookline	March 20, 1909	85
1893	Gage, Edward Franklin	Winthrop	June 1, 1909	46
1852	Galloupe, Isaac Francis	Lynn	May 17, 1909	85
1869	Gilbert, Daniel Dudley	Dorchester	Jan. 3, 1909	70
1869	Hahn, Ammi Ruhamah	Boston	March 30, 1909	67
1867	Hall, Thomas	Boston	May 14, 1909	67
1900	Harding, Walter Allen	Everett	Feb. 16, 1909	34
1883	Harrington, Charles	Jamaica Plain	Sept. 11, 1908	52
1895	Hayes, Irving Benjamin	Florence	Jan. 3, 1909	44
1859	Hooper, Frederick Hubbard	New Bedford	Aug. 31, 1908	78
1877	Jackson, John Henry	Fall River	Oct. 27, 1908	70
1867	Knight, Frederick Irving	Boston	Feb. 20, 1909	67
1868	McAllister, John Gilman	Lawrence	June 20, 1908	66
1885	Marsh, James Elmer	Springfield	Jan. 23, 1909	50
1867	Mercer, William Marcelline	Pittsfield	June 10, 1908	66
1891	Mignault, Armand	Salem	Nov. 13, 1908	53
1884	Millerick, Daniel Edward	Boston	June 18, 1908	52
1898	O'Connor, John James	Holyoke	March 13, 1909	43

1875	Parker, Francis Fullam	Chicopee	Oct.	29, 1908	67
1865	Parsons, John Eleazer	Ayer	Oct.	7, 1908	72
1866	Porter, Charles Burnham	Boston	May	21, 1909	69
1884	Sleeper, Walter Julian	Westford	Aug.	12, 1908	48
1872	Smith, Hermon Joseph	Lowell	Sept.	12, 1908	71
1885	Stedman, Charles Ellery	Brookline	May	24, 1909	78
1908	Troy, Alice Gertrude	Worcester	Feb.	26, 1909	26
1885	Wilkin, Anna Mary	So. Framingham	Sept.	12, 1908	52
1903	Wilson, Howard Eugene	Chester	Sept.	16, 1908	55
1884	Wood, Stephen Andrew	Bedford	Aug.	12, 1908	56
1881	Woodruff, Morgan Lewis	Pittsfield	Feb.	11, 1909	56

Total, 42.

The Secretary read the proceeding of the Board of Trial in the case of G. L. Hagen Burger. Its findings were:

The Board of Trial appointed for the purpose of trying Gottfried Leonard Hagen Burger, upon the charges that he has been guilty of conduct unworthy of honorable physicians, and has presented a false certificate and false statements of educational acquirements as designated in the charges—find that the charges against the said Hagen Burger are not proved, and we recommend that the Society take no action thereon.

Dr. Harvey moved that the action of the Board of Trial be approved.

A prolonged and earnest discussion ensued, in which Drs. Lund, Pierce, Arnold, Cotton, Harvey, Murphy, Crowell, Stone, Cook, and Bartol took part, following which the motion of approval of the action of the Board was defeated.

Dr. Cotton gave notice of additions to the by-laws to be presented at the next annual meeting.

That an additional section of the by-laws be adopted as follows:

The Committee on State and National Legislation shall present to the Council such information as may seem to them to call for action by the Council with regard to initiative as well as defensive work before legislative bodies.

That section 18 of the By-Laws be amended by the insertion, after the word "President" (page 15, line 10), of the following sentence:

They may also investigate and report cases of misconduct of which they have knowledge from any source.

Papers were presented as follows:

THE DIAGNOSIS, PREVALENCE AND PREVENTION OF RABIES.—By Dr. Langdon Frothingham, of Boston. Remarks by Dr. C. F. Withington, of Boston.

The paper was illustrated by numerous lantern slides.

THE RESPONSIBILITY OF THE GENERAL PRACTITIONER FOR FREEDOM OF MEDICAL RESEARCH.—By Dr. W. B. Cannon, of Cambridge. (Read by title.)

At 12 M. the Annual Discourse, by Dr. James G. Mumford of Boston, was read by Dr. H. C. Ernst.

Voted, That the thanks of the Society be presented to Dr. Mumford for his very instructive address.

Also, That the Society thank Dr. Ernst for his admirable delivery of the Discourse.

The following delegates from other State Medical Societies were present:

Maine.—Dr. W. C. Peters.
New Hampshire.—Drs. J. E. A. Lanouette, G. W. Lougee.
Vermont.—Dr. W. S. Nay.
Rhode Island.—Dr. W. L. Chapman.
Connecticut.—Dr. J. F. Calef.
New York.—Dr. A. W. Booth.

At 1 P.M. the annual dinner was served in Mechanic Building to nearly 1200 Fellows.

FRANCIS W. GOSS,
Secretary.

TREASURER'S REPORT, JUNE, 1909.

Receipts.

Balance from previous year			$13,916.93
Assessments paid to District Treasurers:			
Barnstable	$155.00		
Berkshire	365.00		
Bristol North	220.00		
Bristol South	530.00		
Essex North	590.00		
Essex South	690.00		
Franklin	135.00		
Hampden	800.00		
Hampshire	305.00		
Middlesex East	270.00		
Middlesex North	475.00		
Middlesex South	1,580.00		
Norfolk	1,670.00		
Norfolk South	230.00		
Plymouth	410.00		
Suffolk	2,845.00		
Worcester	1,130.00		
Worcester North	325.00		
	$12,725.00	$12,725.00	
Assessments paid to Treasurer		780.00	
Assessments paid at Annual Meeting		970.00	
Total Assessments		$14,475.00	14,475.00
Sale of space at the Annual Meeting		380.00	
Sale of Dinner Tickets at Annual Meeting		12.00	
Interest on deposits subject to Check:			
New England Trust Co.	$172.53		
Bay State Trust Co.	132.93		
	$305.46	305.46	
Interest on Savings Bank deposits:			
Provident Institution for Savings	40.40		
Institution for Savings in Roxbury	40.40		
Franklin Savings Bank	43.38		
Suffolk Savings Bank	37.85		
	$162.03	162.03	
Interest on Massachusetts Bonds		560.00	
Interest on Annuity Bonds of the Mass. Hosp. Life Indowment:			
Policy 97	$478.27		
Policy 98	389.59		
	$867.86	867.86	
		$2,287.35	2,287.35
			$30,679.28

Expenses.

Secretary's Expense:		
Postage and Incidentals	$18.21	
Printing	172.37	
Addressing Circulars	20.00	
Engrossing	16.00	
Mailing Tubes	2.33	
Stenographers	17.20	
Secretary of Surgical Section, Incidentals	5.00	
	$251.11	$251.11
Treasurer's Expense:		
Printing and Postage	$125.49	
Cards for Card Accounts	9.05	
Transportation of Records	2.00	
Clerical Work	31.43	
Clerks at Annual Meeting	60.00	
Box at Bay State Trust Co.	10.00	
Treasurer's Bond	60.00	
Account Book	.65	
	$298.62	298.62
Librarian's Expense:		
Printing	31.12	
Bookbinding	19.20	
Postage	50.00	
Delivering Communications	96.05	
	$196.37	196.37
Censors' Expense		464.50
Supervisors' Expense		31.40
District Treasurers' Expense:		
Commissions	$636.25	
Postage, Stationery and Incidentals	208.58	
	$844.83	844.83
Exchange		1.10
Salaries		1,400.00
Rent		750.00
Annual Dividend		4,500.00
Shattuck Lecture		200.00
Cotting Lunch		101.50
Catalogue:		
Clerical assistance to Librarian	$100.00	
Printing	945.02	
Bookbinding	8.65	
Delivering	71.48	
	$1,125.15	1,125.15
Amount carried forward,		$10,164.58

Amount brought forward,		$10,164.58
Board of Trial:		
Attendance and Mileage		43.95
Committee to Procure Scientific Papers:		
Incidentals		5.00
Committee on Publications:		
Printing		1,679.10
Committee on Ethics:		
Attendance and Mileage	$10.40	
Legal Services	252.11	
	$262.51	262.51
Committee on State and National Legislation:		
Legislative Council (opometry)	$100.00	
Legal Services	50.00	
Stationery and Stenographer	30.46	
Clerical Work	18.50	
Printing	44.50	
Reprints	85.00	
Postage	12.92	
Incidentals	13.85	
	$355.23	355.23
Committee on Tuberculosis:		
Typewriting and Postage	27.58	
Charts	15.00	
Lettering Charts	5.00	
Couches	4.25	
Picture Frames	3.25	
Printing	314.85	
	$369.93	369.93
Committee on Ophthalmia Neonatorum:		
Printing	$66.50	
Mailing Circulars	16.00	
	$82.50	82.50
Delegates to American Medical Association:		
H. P. Arnold—Medical Education	$72.10	
C. H. Cook—Legislative Council	50.35	
	$122.45	122.45
Annual Meeting:		
Printing	72.00	
Addressing Envelopes	22.00	
Rent of Mechanics Hall	663.70	
Lettering Card Signs	3.48	
Badges	2.01	
Carpenters	147.97	
Boston Towel Supply Co.	6.05	
Boston Society for Relief of Tuberculosis	37.92	
Amount carried forward,		$13,085.25

Amount brought forward,		$13,085.25
Secretary, for Section of Tuberculosis	$10.00	
Boston Dental Hygiene Council	13.40	
Stenographer	10.00	
Union Transfer Co.	9.00	
Decorating	40.00	
Florist	60.00	
Music	99.00	
Caterer	2,897.30	
Cigars	200.50	
Incidentals	41.75	
	$4,336.08	4,336.08
	$17,421.33	$17,421.33
Balance,		$13.257.95

This balance was distributed April 15, as follows:

In New England Trust Co.	$6,443.21	
In Bay State Trust Co.	6,857.59	
Undrawn interest, Suffolk Savings Bank	37.85	
	$13,338.65	
Deduct two outstanding checks	80.70	
	$13,257.95	

The permanent investments of the Society are as follows:

Deposit in the Roxbury Institution for Savings, Cotting Fund	$1,000.00
Deposit in the Provident Institution for Savings, Cotting Fund	1,000.00
Deposit in Suffolk Savings Bank, Cotting Fund	1,000.00
Deposit in Franklin Savings Bank, Permanent Fund	1,074.48
Annuity Bond of the Massachusetts Hospital Life Ins. Co., Shattuck Fund	9,166.87
Annuity Bond of the Massachusetts Hospital Life Ins. Co., Permanent Fund	11,253.30
Massachusetts 3½ per cent. bonds, Phillips Fund	10,000.00
" " " " " Permanent Fund	6,000.00
	$40,494.65

EDWARD M. BUCKINGHAM,
Treasurer.

April 15, 1909.

The undersigned, a duly appointed committee, having examined the books of the Treasurer, find them correctly cast and properly vouched, and also that he has in his possession the securities called for.

G. RYDER, *Chairman.*
HENRY S. KILBY.

Boston, May 12, 1909.

Officers of The Massachusetts Medical Society.

1909—1910.

Chosen June 15, 1909.

Silas D. Presbrey,	Taunton,	President.
Joseph G. Pinkham,	Lynn,	Vice-President.
Walter L. Burrage,	Boston,	Secretary.
Edward M. Buckingham,	Boston,	Treasurer.
Edwin H. Brigham,	Brookline,	Librarian.

Standing Committees.

Of Arrangements.

L. W. Gilbert, A. N. Broughton,
C. C. Simmons, F. C. Kidner,
G. H. Francis, David Townsend.

On Publications.

O. F. Wadsworth, G. B. Shattuck, H. L. Burrell.

On Membership and Finance.

F. W. Goss, Walter Ela, C. M. Green,
A. Coolidge, Jr., Samuel Crowell.

To Procure Scientific Papers.

Christopher Seymour, E. W. Taylor, F. B. Lund,
T. J. Robinson, F. P. Denny.

On Ethics and Discipline.

Leonard Wheeler, J. A. Gage, J. W. Bartol,
Henry Jackson, G. deN. Hough.

On Medical Diplomas.

H. E. Marion, O. F. Rogers, H. W. Newhall.

On Medical Education.

H. C. Ernst. H. D. Arnold, C. H. Williams.

On State and National Legislation.

S. D. Presbrey, C. H. Cook, C. F. Withington,
G. W. Gay, F. G. Wheatley.

Presidents of District Societies—Vice-Presidents (Ex-Officiis).

[Arranged according to seniority.]

C. A. Viles,
G. H. Monks,
L. M. Palmer,
L. F. Woodward,
F. J. Ripley,
C. E. Durant,
O. H. Howe,
E. L. Fiske,
H. M. Cutts,
C. W. Jackson,
Philip Hammond,
A. V. Goss,
H. J. Hall,
C. L. Upton,
H. B. Hart,
H. B. Holmes,
F. H. Smith,
A. H. Mandell.

Councillors.

Barnstable.—E. E. Hawes, Harwich; E. S. Osborne, West Dennis.

Berkshire.—J. F. A. Adams, H. Colt, Pittsfield; O. J. Brown, H. Bushnell, North Adams.

Bristol North.—F. A. Hubbard, S. D. Presbrey, E. Washburn, Taunton.

Bristol South.—W. A. Dolan, J. H. Gifford, H. G. Wilbur, Fall River; G. deN. Hough, C. A. Pratt, A. P. Webber, New Bedford.

Essex North.—J. F. Burnham, C. G. Carleton, Lawrence; I. J. Clarke, Haverhill; J. A. Douglass, Amesbury; E. H. Noyes, F. W. Snow, Newburyport; F. E. Sweetsir, Merrimac; L. J. Young, Haverhill.

Essex South.—R. E. Bicknell, Swampscott; H. C. Boutelle, Danvers; E. E. Cleaves, Rockport; D. J. Finegan, Gloucester; H. K. Foster, J. F. Jordan, Peabody; P. P. Johnson, Beverly; H. T. Penny, Cliftondale; P. L. Sanborn, Marblehead; B. F. Sturgis, Salem.

Franklin.—G. P. Twitchell, Greenfield; N. P. Wood, Northfield.

Hampden.—C. A. Allen, Holyoke; R. P. M. Ames, V. J. Irwin, D. E. Keefe, C. F. Lynch, A. O. Squier, W. R. Weiser, Springfield; E. Flood, Palmer; L. J. Gibbs, Chicopee Falls.

Hampshire.—J. S. Hitchcock, J. A. Houston, C. Seymour, Northampton.

Middlesex East.—C. J. Allen, Winchester; C. Dutton, Wakefield; A. C. Lane, Woburn.

Middlesex North.—W. B. Jackson, W. M. Jones, J. E. Lamoureux, G. H. A. Leahey, C. E. Simpson, Lowell; A. G. Scoboria, Chelmsford.

Middlesex South.—G. A. Bancroft, Natick; L. B. Clark, Waverley; H. F. Curtis, East Somerville; J. A. Dow, A. W. Dudley, Cambridge; G. W. Gay, Chestnut Hill; J. F. O'Brien, Charlestown; L. M. Palmer, South Framingham; E. M. Plummer, Charlestown; W. Preble, Cambridge; C. E. Prior, G. Ryder, Malden; F. W. Rice, Allston; W. S. Richardson, Marlborough; F. G. Smith, H. S. Trueman, Somerville; E. P. Stickney, Arlington; E. H. Stevens, F. W. Taylor, H. P. Walcott, Cambridge; G. L. West, Newton Centre; A. Worcester, Waltham.

Norfolk.—E. H. Baxter, Hyde Park; B. S. Blanchard, L. W. Gilbert, Brookline; M. J. Cronin, C. B. Darling, E. T. Galligan, Roxbury; S. Crowell, Dorchester: F. P. Drew, Dedham; H. T. Holland, G. H. Ingalls, E. B. Lane, Jamaica Plain; F. C. Jillson, West Roxbury; G. N. Jones, Wellesley Hills; C. D. Knowlton, Roxbury; M. V. Pierce, Milton; H. V. Reynolds, Dorchester; T. J. Shanahan, Brookline; H. C. Towle, H. F. R. Watts, Dorchester; W. A. White, Roxbury; A. G. Williams, Brookline; A. M. Worthington, Dedham.

Norfolk South.—F. H. Gile, Braintree; F. E. Jones, Quincy; J. W. Spooner, Hingham.

Plymouth.—N. K. Noyes, Duxbury; G. Osgood, Rockland; A. E. Paine, Brockton; F. G. Wheatley, North Abington.

Suffolk.—H. D. Arnold, J. B. Ayer, J. B. Blake, E. G. Brackett, E. M. Buckingham, H. L. Burrell, A. T. Cabot, A. Coolidge, Jr., F. J. Cotton, E. G. Cutler, J. W. Farlow, R. H. Fitz, W. W. Gannett, C. M. Green, H. A. Lothrop, J. H. Mc-

Collom, A. B. Morong, J. G. Mumford, A. H. Nichols, W. L. Richardson, T. M. Rotch, G. H. M. Rowe, J. D. K. Sabine, G. G. Sears, F. C. Shattuck, G. B. Shattuck, A. K. Stone, H. F. Vickery, O. F. Wadsworth, G. H. Washburn, J. C. White, H. Williams, G. Wolcott, Boston.

WORCESTER.—W. P. Bowers, Clinton; J. T. Duggan, O. H. Everett, G. E. Francis, H. Gage, T. H. Gage, R. W. Greene, D. Harrower, Worcester; E. B. Harvey, Westboro'; E. W. Norwood, Spencer; L. Wheeler, S. B. Woodward, Worcester.

WORCESTER NORTH.—C. E. Bigelow, Leominster; E. P. Miller, F. H. Thompson, Fitchburg; E. A. Sawyer, Gardner.

Censors.

BARNSTABLE.—C. M. Baker, C. E. Harris, Hyannis; E. E. Hawes, *Supervisor*, Harwich; J. H. Higgins, Marston's Mills; E. M. Parker, South Yarmouth.

BERKSHIRE.—J. F. A. Adams, *Supervisor*, Pittsfield; M. M. Brown, H. Bushnell, North Adams; S. C. Burton, J. B. Thomas, Pittsfield.

BRISTOL NORTH.—A. R. Crandell, A. S. Deane, F. A. Hubbard, *Supervisor*, D. J. Mehegan, T. J. Robinson, Taunton.

BRISTOL SOUTH.—A. I. Connell, W. A. Dolan, *Supervisor*, Fall River; S. W. Hayes, J. C. Pothier, New Bedford; A. B. Cushman, South Dartmouth.

ESSEX NORTH.—R. M. Birmingham, J. A. Magee, Lawrence; J. A. Fitz-Hugh, Amesbury; F. B. Pierce, L. J. Young, *Supervisor*, Haverhill.

ESSEX SOUTH.—J. J. Egan, Gloucester; H. K. Foster, *Supervisor*, Peabody; W. B. Little, Lynn; G. E. MacArthur, Ipswich; G. A. Stickney, Beverly.

FRANKLIN.—E. G. Best, C. C. Messer, Turner's Falls; J. W. Cram, Colrain; C. G. Trow, Sunderland; N. P. Wood, *Supervisor*, Northfield.

HAMPDEN.—V. J. Irwin, *Supervisor*, W. C. Leary, F. S. Ward, Springfield; J. P. Schneider, Palmer; G. L. Taylor, Holyoke.

HAMPSHIRE.—J. J. Burke, East Hampton; C. A. Byrne, Hatfield; J. G. Hayes, Williamsburg; J. S. Hitchcock, *Supervisor*, Northampton; M. W. Pearson, Ware.

MIDDLESEX EAST.—D. C. Dennett, Winchester; W. H. Keleher, A. C. Lane, *Supervisor*, Woburn; F. E. Park, Stoneham; R. D. Perley, Melrose.

MIDDLELEX NORTH.—W. G. Eaton, J. A. Gage, J. V. Meigs, C. E. Simpson, *Supervisor*, E. J. Welch, Lowell.

MIDDLESEX SOUTH.—G. A. Bancroft, *Supervisor*, Natick; G. P. Cogswell, Cambridge; A. Greenwood, Waltham; J. W. Lawrence, Malden; E. D. Pillsbury, Somerville.

NORFOLK.—A. N. Broughton, Jamaica Plain; C. S. Francis, Brookline; E. T. Galligan, *Supervisor*, Roxbury; R. M. Merrick, Dorchester; J. W. Pratt, Dedham.

NORFOLK SOUTH.—T. J. Dion, F. E. Jones, *Supervisor*, J. F. Welch, Quincy; J. H. Libby, East Weymouth; W. H. W. Sturgis, Allerton.

PLYMOUTH.—A. L. Beals, E. C. Frost, Brockton; J. Frame, G. Osgood, *Supervisor*, Rockland; C. W. Stodder, Marshfield Hills.

SUFFOLK.—E. G. Brackett, *Supervisor*, L. R. G. Crandon, W. E. Fay, W. F. Gay, C. H. Hare, Boston.

WORCESTER.—F. H. Baker, R. W. Greene, *Supervisor*, R. P. Watkins, Worcester; J. J. Goodwin, Clinton; A. G. Hurd, Millbury.

WORCESTER NORTH.—J. B. Donnelly, West Gardner; E. P. Miller, *Supervisor*, E. J. Tully, Fitchburg; H. W. Page, Baldwinsville; A. H. Pierce, Leominster.

Commissioners of Trials.

Barnstable	S. H. Sears	Yarmouthport.
Berkshire	A. T. Wakefield	Sheffield.
Bristol North	C. S. Holden	Attleborough.
Bristol South	G. L. Richards	Fall River
Essex North	J. F. Croston	Haverhill.
Essex South	J. E. Simpson	Salem.
Franklin	F. E. Johnson	Erving.
Hampden	Philip Kilroy	Springfield.
Hampshire	J. B. Learned	Florence.
Middlesex East	E. S. Jack	Melrose.
Middlesex North	F. E. Varney	North Chelmsford.
Middlesex South	L. R. Stone	Newton.
Norfolk	M. V. Pierce	Milton.
Norfolk South	G. W. Tinkham	Weymouth.
Plymouth	J. H. Averill	Campello.
Suffolk	M. F. Gavin	South Boston.
Worcester	E. V. Scribner	Worcester.
Worcester North	L. G. Chandler	Townsend.

Officers of the District Medical Societies.

Barnstable.—H. B. Hart, East Dennis, *President;* C. W. Milliken, Barnstable, *Vice-President;* J. P. Nickerson, West Harwich, *Secretary;* W. D. Kinney, Osterville, *Treasurer.*

Berkshire.—H. B. Holmes, Adams, *President;* C. S. Chapin, Great Barrington, *Vice-President;* I. S. F. Dodd, Pittsfield, *Secretary;* W. L. Paddock, Pittsfield, *Treasurer.*

Bristol North.—A. V. Goss, Taunton, *President;* A. R. Crandell, Taunton, *Vice-President;* R. D. Dean, Taunton, *Secretary;* W. Y. Fox, Taunton, *Treasurer.*

Bristol South.—A. H. Mandell, New Bedford, *President;* A. W. Buck, Fall River, *Vice-President;* A. J. Abbe, Fall River, *Secretary and Treasurer.*

Essex North.—C. E. Durant, Haverhill, *President;* W. W. Pillsbury, Newburyport, *Vice-President;* J. F. Burnham, Lawrence, *Secretary and Treasurer.*

Essex South.—H. J. Hall, Marblehead, *President;* A. T. Hawes, Lynn, *Vice-President;* G. K. Blair, Salem, *Secretary;* G. Z. Goodell, Salem, *Treasurer.*

FRANKLIN.—C. L. Upton, Shelburne Falls, *President;* L. A. Newton, Greenfield, *Vice-President;* H. N. Howe, Greenfield, *Secretary and Treasurer.*

HAMPDEN.—C. W. Jackson, Monson, *President;* H. W. Van Allen, Springfield, *Vice-President;* R. S. Benner, Springfield, *Secretary and Treasurer.*

HAMPSHIRE.—F. H. Smith, Hadley, *President;* D. M. Ryan, Ware, *Vice-President;* A. G. Minshall, Northampton, *Secretary;* A. H. Hoadley, Northampton, *Treasurer.*

MIDDLESEX EAST.—Philip Hammond, Winchester, *President;* E. D. Richmond, Reading, *Vice-President;* F. R. Sims, Melrose, *Secretary;* C. Dutton, Wakefield, *Treasurer.*

MIDDLESEX NORTH.—C. A. Viles, Lowell, *President;* O. P. Porter, Lowell, *Vice-President;* A. R. Gardner, Lowell, *Secretary;* T. B. Smith, Lowell, *Treasurer.*

MIDDLESEX SOUTH.—L. M. Palmer, South Framingham, *President;* F. W. Taylor, Cambridge, *Vice-President;* W. L. Bond, West Somerville, *Secretary;* W. Ela, Cambridge, *Treasurer.*

NORFOLK.—H. M. Cutts, Brookline, *President;* A. H. Hodgdon, Dedham, *Vice-President;* Bradford Kent, Dorchester, *Secretary;* G. W. Kaan, Brookline, *Treasurer.*

NORFOLK SOUTH.—O. H. Howe, Cohasset, *President;* E. W. Mayberry, South Weymouth, *Vice-President;* C. S. Adams, Wollaston, *Secretary and Treasurer.*

PLYMOUTH.—F. J. Ripley, Brockton, *President;* C. S. Millet, Brockton, *Vice-President;* A. C. Smith, Brockton, *Secretary and Treasurer.*

SUFFOLK.—G. H. Monks, Boston, *President;* R. H. Fitz, Boston, *Vice-President;* D. D. Scannell, Boston, *Secretary;* W. H. Prescott, Boston, *Treasurer.*

WORCESTER.—L. F. Woodward, Worcester, *President;* A. C. Getchell, Worcester, *Vice-President;* G. E. Emery, Worcester, *Secretary;* G. O. Ward, Worcester, *Treasurer.*

WORCESTER NORTH.—E. L. Fiske, Fitchburg, *President;* W. N. Cowles, Ayer, *Vice-President;* W. F. Sawyer, Fitchburg, *Secretary;* F. H. Thompson, Jr., Fitchburg, *Treasurer.*

The Massachusetts Medical Society.

PROCEEDINGS OF THE COUNCIL.

OCTOBER 6, 1909.

A STATED MEETING of the Council of The Massachusetts Medical Society was held in John Ware Hall, in the Boston Medical Library, October 6, 1909, at 4 P.M., the President, Dr. SILAS D. PRESBREY, in the chair. The following seventy-one Councillors were present:

Berkshire.
O. J. Brown.

Bristol North.
F. A. Hubbard,
S. D. Presbrey,
E. Washburn.

Bristol South.
W. A. Dolan,
J. H. Gifford.

Essex North.
J. F. Burnham,
C. G. Carleton,
I. J. Clarke,
E. H. Noyes,
F. W. Snow.

Essex South.
H. C. Boutelle,
D. J. Finegan,
J. F. Jordan,
H. T. Penny.

Franklin.
J. P. Twitchell.

Middlesex East.
C. Dutton,
A. C. Lane.

Middlesex North.
W. B. Jackson,
A. G. Scoboria.

Middlesex South.
J. A. Dow,
H. F. Curtis,
G. W. Gay,
J. F. O'Brien,
L. M. Palmer,
W. Preble,
C. E. Prior,
F. W. Rice,
G. Ryder,
E. P. Stickney,
F. G. Smith,
F. W. Taylor,
H. S. Trueman.

Norfolk.
E. H. Baxter,
B. S. Blanchard,
S. Crowell,
L. W. Gilbert,
H. T. Holland,
C. H. Ingalls,
F. C. Jillson,
C. D. Knowlton,
M. V. Pierce,
H. V. Reynolds,
T. J. Shanahan,
H. F. R. Watts,
W. A. White,
A. G. Williams.

Norfolk South.
F. E. Jones,
J. W. Spooner.

Plymouth.
N. K. Noyes,
G. Osgood,
F. G. Wheatley.

Suffolk.
H. D. Arnold,
J. B. Ayer,
J. B. Blake,
F. J. Cotton,
C. M. Green,
A. H. Nichols,
W. L. Richardson,
F. C. Shattuck,
A. K. Stone,
J. C. White,
H. Williams.

Worcester.
O. H. Everett,
H. Gage,
R. W. Greene,
D. Harrower,
E. B. Harvey,
E. W. Norwood,
L. Wheeler.

Worcester North.
C. E. Bigelow.

The record of the last meeting was read and accepted.

Dr. David D. Scannell, of Boston, was appointed a member of the Committee on State and National Legislation, to fill the vacancy caused by the resignation of Dr. C. H. Cook; and Dr. J. Bapst Blake, of Boston, was appointed a delegate to the American Medical Association for the year 1909–10, to fill the vacancy caused by the resignation of Dr. J. L. Morse.

The following were appointed delegates to the American Medical Association for 1910–11:

H. D. Arnold, Boston.
Homer Gage, Worcester.
O. J. Brown, North Adams.

Alternates: F. J. Cotton, Boston.
F. W. Anthony, Haverhill.
W. A. Dolan, Fall River.

The following were appointed delegates to the meetings of State Societies:

Vermont.—J. H. Higgins, Marston's Mills; G. S. Allen, Lawrence.

New York.—S. B. Woodward, Worcester; A. R. Crandell, Taunton.

Rhode Island.—F. A. Hubbard, Taunton; H. P. Mosher, Boston.

Maine.—E. W. Taylor, Boston; G. Z. Goodell, Salem.

New Hampshire.—S. H. Sears, Yarmouthport; E. S. Jack, Melrose.

Connecticut.—F. S. Ward, Springfield; George P. Twitchell, Greenfield.

New Jersey.—W. W. Miner, Ware; J. H. Gifford, Fall River.

The Committee on Membership and Finance reported through Dr. Goss, and it was voted,—That all extraordinary expenditures be referred to the Committee on Membership and Finance, before they are presented to the Council for action.

At the suggestion of the Committee on Publications it was voted,—That the Annual Discourse be the property of The Massachusetts Medical Society, the orator being informed when he is appointed that such has been the vote of the Society.

The reports of the Committee on Contract Work were discussed by several members, and finally the motion of Dr. E. B. Harvey that this matter be indefinitely postponed, was adopted.

Subsequently, on the motion of Dr. L. M. Palmer, it was voted that the District Societies be asked to consider further the question of Contract Work during the year, and report to the Council.

Adjourned at 5.11 P.M.

WALTER L. BURRAGE,
Secretary.

February 2, 1910.

A Stated Meeting of the Council was held in John Ware Hall, in the Boston Medical Library, on February 2, at twelve o'clock, noon, the Vice-President, Dr. Joseph G. Pinkham, being in the chair, and the following seventy-two Councillors present:

Berkshire.
J. F. A. Adams.

Bristol South.
W. A. Dolan,
G. deN. Hough,
H. G. Wilbur.

Essex North.
J. F. Burnham,
J. A. Douglass,
E. H. Noyes,
F. W. Snow.

Essex South.
R. E. Bicknell,
J. F. Jordan,
H. T. Penny.

Franklin.
G. P. Twitchell.

Hampshire.
C. Seymour.

Middlesex East.
C. J. Allen,
C. Dutton.

Middlesex South.
G. A. Bancroft,
H. F. Curtis,
J. A. Dow,
A. W. Dudley,
G. W. Gay,
J. F. O'Brien,
L. M. Palmer,
W. Preble,
C. E. Prior,
F. W. Rice,
E. H. Stevens,
F. W. Taylor,
A. S. Trueman,
G. L. West,
A. Worcester.

Norfolk.
E. H. Baxter,
B. S. Blanchard,
C. B. Darling,
F. P. Drew,
H. T. Holland,
G. N. Jones,
E. B. Lane,
M. V. Pierce,
H. F. R. Watts,
A. G. Williams.

Norfolk South.
F. E. Jones,
J. W. Spooner.

Plymouth.
G. Osgood,
A. E. Paine,
F. G. Wheatley.

Suffolk.
H. D. Arnold,
E. M. Buckingham,
A. Coolidge, Jr.,
E. G. Cutler,
R. H. Fitz,
J. W. Farlow,
C. M. Green,
A. B. Morong,
J. G. Mumford,
W. L. Richardson,
Jane D. K. Sabine,
F. C. Shattuck,
George B. Shattuck,
G. G. Sears,
A. K. Stone,
H. F. Vickery,
O. F. Wadsworth,
G. H. Washburn,
J. C. White,
Grace Wolcott.

Worcester.
O. H. Everett,
G. E. Francis,
D. Harrower,
E. B. Harvey,
E. W. Norwood,
L. Wheeler.

Worcester North.
F. H. Thompson.

The record of the last meeting was read and accepted.

Dr. O. F. Wadsworth, for the Committee on Publications, reported that Dr. Richard C. Cabot had been appointed Shattuck Lecturer for the year 1911.

Dr. F. W. Goss, for the Committee on Membership and Finance, recommended, and in accordance with the recommendation of this

Committee it was voted, that the following members be placed on the retired list:

F. H. Brown, Bostor.
Algernon Coolidge, Boston.
E. E. Mather, Williamstown.
E. T. Williams, Roxbury.

Also that the resignations of the following members be accepted:

Lilley Eaton, Richmond, Va.
R. H. Goldthwaite, U. S. A.

Also that the following forty-seven members be deprived of the privileges of membership for non-payment of dues:

C. B. Adams, New York City.
Eva A. Adams, Brunswick, Me.
J. F. R. Biron, Amesbury.
H. A. Brown, Whitinsville.
G. S. Cahill, Cambridge.
G. L. Closson, address unknown.
B. C. Darling, Kansas City, Mo.
S. Delano, Boston.
C. Dudley, Cambridge.
W. G. Dwinell, Pawtucket, R. I.
R. C. Fish, Worcester.
E. M. Frissell, Webster.
M. Gerstein, Roxbury.
W. A. Greene, Charlton City.
G. H. Gorham, Tabernilla, Canal Zone.
J. C. Graves, Jr., Spokane, Wash.
J. J. Hanley, Denver, Colo.
Mabel S. Haynes, address unknown.
C. W. Hoyt, Rochester, N. Y.
A. A. Keeley, Fall River.
H. W. Knight, Saco, Me.
W. G. Lee, Chicago, Ill.
W. J. Leonard, Springfield.
J. D. McCauley, Cambridge.
F. A. Mackenzie, Roxbury.
R. H. McNair, Longmeadow.
Q. H. Merrill, Dudley.
J. M. Murphy, Malden.
H. P. Nottage, Oakland, Cal.
O. S. O'Brien, Rockport.
E. E. O'Donnell, Brockton.
C. H. Phillips, Beverly.

E. F. Pope, Spokane, Wash.
A. H. Prouty, North Brookfield.
Caroline T. Reed, Cambridge.
D. Robinson, Portland, Oregon.
E. F. Ross, Wales.
J. E. Rourke, Dorchester.
C. B. Russell, Paterson, N. J.
E. B. Schallenbach, Chelsea.
M. C. Schroeder, New York City.
F. W. Seymour, Rochester, N. Y.
W. D. Shurtleff, Kingston.
D. M. Trecartin, Bridgeport, Ct.
R. H. Wald, Hastings, Minn.
E. de W. Wales, Indianapolis, Ind.
Julia R. Youngman, address unknown.

Also that dues be remitted to Caroline L. Thomas, of Malden, to the amount of $25.00.

Dr. G. W. Gay, for the Committee on State and National Legislation, reported at length concerning the bills on subjects having to do with the public health, now before the Massachusetts Legislature, and in accordance with a motion by Dr. J. C. White, it was voted that this report together with a resolution offered by Dr. E. B. Harvey, opposing the Optometry Bill, be published in *The Boston Medical and Surgical Journal*, and a copy sent to every member.

Dr. A. K. Stone, for the special Committee appointed at the last meeting to consider certain amendments to the By-Laws, reported the following proposed amendments:

1. Section 1 (page 9). In the 5th line—omit the word "received."
2. Section 18 (page 15), insertion after the word "President" (page 15, line 10) of the following sentence:—"They shall also investigate and report cases of misconduct of which they have knowledge from any source."
3. Section 19 (page 15). In line 22—after the word "accused" insert the following phrase:—"and to all members of the District Society of which the accused is a member."
4. Committee on State and National Legislation, a new Section of the By-Laws to be known as Section 21, to read as follows:—The Committee on State and National Legislation shall present to the Council such information as may seem to them to call for action by the Council with regard to initiative as well as defensive work before the legislative bodies.

After discussion by Drs. E. B. Harvey, G. E. Francis, F. W. Goss, H. D. Arnold and A. K. Stone, it was voted that the amendments be presented to the next annual meeting of the Society.

On the nomination of the Vice-President, Dr. H. S. Kilby and Dr. C. C. Sheldon were appointed a Committee to audit the Treasurer's accounts.

The resignation of Dr. W. P. Bolles as a delegate to the Convention for the Revision of the United States Pharmacopœia to be held in May, 1910, was accepted, and Dr. C. H. Cook was appointed in his place.

Dr. G. W. Gay offered the following motion:

"That the members of the Board of Trustees and of the various Councils and Committees, Standing and Special, of the American Medical Association residing in Massachusetts, together with the delegates and their alternates from the Massachusetts Medical Society, be invited to attend the meetings of this Council."

This motion was adopted.

A communication from C. Bertrand Thompson, Organization Secretary of the Boston-1915 movement, inviting the coöperation of the Society in the movement, was read by the Secretary, and on motion of Dr. Arnold it was voted that the matter be referred to the district societies most intimately concerned, viz.—Suffolk Norfolk, Middlesex South and Essex South.

Dr. Dolan presented a request from the Bristol South District Medical Society that the townships of Middleborough and Lakeville be transferred from the Bristol South District to the Bristol North District, and that the townships of Swansea and Somerset be transferred from the Bristol North District to the Bristol South District. On the motion of Dr. W. A. Dolan, it was voted that the matter be referred to a Committee composed of the Presidents of the Barnstable, Bristol North and Bristol South Districts, with instructions to report to the next meeting of the Council.

Adjourned at 1.30 P.M.

WALTER L. BURRAGE,
Secretary.

JUNE 7, 1910.

THE ANNUAL MEETING of the Council of The Massachusetts Medical Society was held in John Ware Hall, in the Boston Medical Library, on June 7, 1910, at 5 P.M., the President, Dr. SILAS D. PRESBREY, in the chair. The following ninety-two Councillors were present:

Barnstable.
E. E. Hawes.

Berkshire.
J. F. A. Adams,
L. A. Jones.

Bristol North.
F. A. Hubbard,
S. D. Presbrey,
E. Washburn.

Bristol South.
J. H. Gifford,
A. P. Webber,
H. C. Wilbur.

Essex North.
J. F. Burnham,
C. G. Carleton,
J. A. Douglass,
E. H. Noyes,
F. B. Pierce,
E. W. Snow,
F. E. Sweetsir,
I. J. Clarke.

Essex South.
R. E. Bicknell.

Franklin.
G. P. Twitchell.

Hampden.
E. A. Bates,
M. W. Harrington,
W. C. Leary,
R. B. Ober.

Hampshire.
J. S. Hitchcock,
F. H. Smith.

Middlesex East.
J. S. Clark,
R. T. Edes,
A. E. Small.

Middlesex North.
G. H. A. Leahey.

Middlesex South.
J. A. Dow,
A. W. Dudley,
G. W. Gay,
S. R. Lancaster,
L. M. Palmer,
E. D. Pillsbury,
C. E. Prior,
F. W. Rice,
G. Ryder,
E. H. Stevens,
J. O. Tilton.

Norfolk.
E. H. Baxter,
S. Crowell,
C. B. Darling,
F. P. Drew,
L. W. Gilbert,
F. W. Goss,
R. W. Hastings,
H. T. Holland,
G. N. Jones,
E. B. Lane,
T. J. O'Brien,
H. V. Reynolds,
E. T. Rollins,
F. W. Stetson,
A. G. Williams.

Norfolk South.
D. A. Bruce,
W. A. Drake,
N. S. Hunting.

Plymouth.
N. K. Noyes,
G. Osgood,
A. E. Paine.

Suffolk.
F. G. Balch,
J. W. Bartol,
E. M. Buckingham,
A. T. Cabot,
F. J. Cotton,
W. H. Devine,
R. H. Fitz,
C. M. Green,
C. H. Hare,
J. H. McCollom,
J. J. Minot,
W. L. Richardson,
J. D. K. Sabine,
G. G. Sears,
H. F. Vickery,
O. F. Wadsworth,
J. C. White,
H. Williams,
C. F. Withington,
G. Wolcott.

Worcester.
W. P. Bowers,

J. T. Duggan,	D. Harrower,	*Worcester North.*
O. H. Everett,	E. W. Norwood,	C. E. Bigelow,
R. W. Greene,	W. G. Reed,	E. P. Miller.
E. B. Harvey,	S. B. Woodward.	

The President stated that, owing to a serious accident, the Secretary, Dr. Burrage, was unable to be present at the meeting. It was voted that Dr. F. W. Goss be appointed Secretary pro tem, until Dr. Burrage should be able to fulfil the duties of his office.

The record of the last meeting was read and accepted.

The Treasurer, Dr. BUCKINGHAM, read his annual report.

The Auditing Committee reported that they found the accounts correctly cast and properly vouched, and that the Treasurer has in his possession the securities called for.

Voted, To accept the Treasurer's report.

The Committee on Membership and Finance reported through Dr. Goss.

Attention was called to the fact that, though the receipts of the treasury are somewhat increased year by year, the balance of late years has as a rule been smaller, owing especially to new objects for which expenditures have been made. The *per capita* reversions to the District Societies have been reduced as the membership of the Society has increased, and the Committee expressed the hope that the calls upon the treasury for extraordinary expenditures would be as few and as small as possible.

The Committee recommended that $4500.00 of the surplus remaining in the treasury be distributed among the District Societies.

Also that George Hartley Gorham, of Tabernilla, Canal Zone, be restored to the privileges of membership.

That the following be placed on the retired list:—

Normal Call, Brookline.
Edward Cowles, Plymouth.
Bennett F. Davenport, Watertown.
James S. Greene, Dorchester.

James A. McDonald, Charlestown.
Charles B. Purvis, Brookline.
George L. Rice, North Adams.
Frank T. Vinal, Scituate.

Also that the resignations of the following be accepted:—

William F. Farmer, Tewksbury.
Fletcher Hodges, Indianapolis.
Edwin R. Lewis, Clinton.
Edward A. McCullough, Meriden, Ct.
Henry E. Marston, Pittsfield, Me.
Clarence E. Meramble, Lynn.
Malcolm D. Miller, Brookline.
Philip S. Potter, North Adams.

Voted, To adopt these recommendations.

On the petition to the Committee from the Associated Committees for the Prevention and Control of Tuberculosis, that $400.00 be appropriated for the work of the Tuberculosis Committee for the coming year, it was recommended that $200.00 be appropriated for the general work of the Committee, and that its report for the current year be printed as a part of the Medical Communications of the Society.

Dr. Cabot, chairman of the Tuberculosis Committee, stated that the report published by this Committee is one of the best works which it does. No other State Medical Society does so good work as ours on tuberculosis. To publish its report in the Medical Communications would not accomplish its purpose so well as to have it issued as a separate pamphlet. He moved, and it was voted as an amendment to the Finance Committee's report, that $400.00 be appropriated for the use of the Committee on Tuberculosis, and that a separate report, as heretofore, be issued by this Committee.

Voted, To adopt the report as amended by Dr. Cabot.

A report was presented from Dr. Ernst, delegate to the annual conference of the Council on Medical Education of the American Medical Association, which was held in Chicago, Feb. 28 to March 2, 1910. The report stated that there was a large attendance and the interest shown was great. The address of President Pritchett, of the Carnegie Foundation for the advancement of

teaching, probably attracted the most attention. It touched notably on the over-production of physicians which is going on all over the country, and the excuses advanced for low standards.

Dr. Gay, for the Committee on State and National Legislation, reported that the Committee had taken cognizance of between thirty and forty bills of the seventy or eighty pertaining to public health matters which were presented to the Legislature during its present session. No bill which has been actively opposed by the Committee has become a law. The principal measure advocated by the Committee which has failed of enactment was one giving the courts the common law power to charge the jury upon medical expert evidence. The report mentioned many measures in which the Committee was interested that have been enacted at this session of the Legislature. The optometry bill was defeated 162 to 59.

The Committee appointed to consider the reapportioning of the territory of the Bristol North and Bristol South Districts recommended the following as desired by the petitioners:—

That the towns of Middleborough and Lakeville be transferred from Bristol South to Bristol North District, and that the towns of Swansea and Somerset be transferred from Bristol North to Bristol South District.

Voted, To adopt the report.

Dr. Christian, delegate to the Association of American Medical Colleges, reported his presence at its sessions in Baltimore March 21–22, 1910. The chief subject considered was a curriculum to represent the type to be regarded as a minimal requirement for admission of medical colleges to the Association. The Harvard Medical School became a member of the organization. Papers were read and discussions were held in connection with medical education.

Dr. Brigham, the Librarian, presented his report.

The Committee on Nominations reported the following list of candidates for the officers of the Society for the ensuing year, and the same were elected by ballot:—

President . .	George B. Shattuck, of Boston.
Vice-President . .	Halbert G. Stetson, of Greenfield.
Secretary . .	Walter L. Burrage, of Boston.
Treasurer . .	Edward M. Buckingham, of Boston.
Librarian . .	Edwin H. Brigham, of Brookline.

Maurice H. Richardson, of Boston, was chosen Orator for the annual meeting in 1911.

The following Standing Committees were appointed :—

Of Arrangements.

C. C. Simmons, F. C. Kidner,
G. H. Francis, David Townsend,
A. N. Broughton, John Homans.

On Publications.

O. F. Wadsworth, G. B. Shattuck, J. C. Munro.

On Membership and Finance.

F. W. Goss, Walter Ela, C. M. Green,
A. Coolidge, Jr. Samuel Crowell.

To Procure Scientific Papers.

Christopher Seymour, E. W. Taylor, F. B. Lund,
T. J. Robinson, F. P. Denny.

On Ethics and Discipline.

Leonard Wheeler, J. A. Gage, J. W. Bartol,
Henry Jackson, G. deN. Hough.

On Medical Diplomas.

O. F. Rogers, H. W. Newhall, J. F. Burnham.

On Medical Education.

H. C. Ernst, H. D. Arnold, C. H. Williams.

On State and National Legislation:

G. B. Shattuck, C. F. Withington, G. W. Gay,
F. G. Wheatley, D. D. Scannell.

To fill a vacancy in the Board of Censors for the Essex South District it was voted that Dr. J. F. O'Shea, of Lynn, be appointed in place of Dr. C. G. Parcher.

Also in the Board of Censors of the Middlesex East District, Dr. A. C. Lane, of Woburn, in place of Dr. H. A. Gale.

A letter from Dr. Christian was read advocating that a change of date of the annual meeting of the Society be made that it may not conflict with that of the American Medical Association, and that the annual meeting of the Society be held in different parts of the State instead of continuously in Boston.

The Secretary stated that by By-law 8 the Council may at any meeting change the place or time, or both place and time of the annual meeting.

On motion of Dr. Gay, amended by Dr. Harvey, it was voted,— That it is the sense of the Council that the annual meeting of the Society be held on the third Wednesday in June whenever the annual meeting of the American Medical Association may be held upon the second Wednesday of that month.

The Secretary announced that in accordance with the vote passed October 6, 1909, recommending the District Societies to discuss the question of Contract Work and report their conclusions to the Council, that 10 Districts had been heard from.

Voted,—That the reports be received as a report of progress.

Adjourned at 6.45 P.M.

FRANCIS W. GOSS,
Secretary pro tem.

The Massachusetts Medical Society.

PROCEEDINGS OF THE SOCIETY.

ANNUAL MEETING.

First Day.

June 7, 1910.

Meetings of Sections were organized and held in the Boston Medical Library, Boston, on Tuesday, June 7, 1910, as follows: —

11 A.M.

SECTION ON TUBERCULOSIS.

Dr. Arthur T. Cabot, Boston . . . . . Chairman.
Dr. Thomas F. Harrington, Boston . . . . . Secretary.
Dr. John B. Hawes, 2d, Boston . . Corresponding Secretary.

Educational Methods in the Anti-Tuberculosis Campaign, by Dr. John B. Hawes, 2d, of Boston. Discussion by Dr. Walter G. Phippen, Salem; Erik St. J. Johnson, New Bedford; Dr. William W. Marvel, Fall River; Dr. Eugene A. Darling, Cambridge; Dr. Thomas F. Harrington, Boston, and others.

2 P.M.

SECTION IN SURGERY.

Dr. Fred B. Lund, Boston . . . . . Chairman.
Dr. Walter C. Howe, Boston . . . . . Secretary.

The Surgical Treatment of Exophthalmic Goitre.— Dr. Charles A. Porter, Boston. Discussion by Dr. James M. Jackson, Boston.

Some Observations on the Surgery of the Vascular System. Dr. Jushua C. Hubbard, Boston.

Acute Pancreatitis, with Report of a Case.—Dr. Philemon E. Truesdale, Fall River. Discussion opened by Dr. David D. Scannell, Boston, and others.

The Plastic Surgery of the Tubes and Ovaries.—Dr. Walter C. Seelye, Worcester. Discussion opened by Dr. Ernest B. Young, Boston.

2 P.M.

SECTION IN MEDICINE.

Dr. Edward W. Taylor, Boston . . . . . Chairman.
Dr. Francis P. Denny, Brookline . . . . . Secretary.

The Clinical Aspects of Arteriosclerosis.—Dr. Henry Jackson, Boston. Discussion by Dr. George G. Sears, Boston.

Medical Inspection of Public Schools.—Dr. Justus G. Hanson, Northampton. Discussion by Dr. Thomas F. Harrington, Boston.

The Physiological Standardization of Digitalis.—Dr. Joseph H. Pratt, Boston.

The Present Status of the Treatment of Exophthalmic Goitre.—Dr. James M. Jackson, Boston. Discussion by Dr. Channing Frothingham, Boston; Dr. Charles A. Porter, Boston.

At. 8 P.M. the Shattuck Lecture was delivered by Dr. Frederic H. Gerrish of Portland, Maine; his subject being, "A Crusade against Syphilis and Gonorrhea."

Following the lecture there was an informal social hour, and refreshments were served.

Second Day.

June 8, 1910.

The Society met in Mechanics Building, Boston, on Wednesday, June 8, 1910, at 9.30 A.M, for the one hundred and twenty-ninth anniversary.

The President, Dr. Silas D. Presbrey, in the chair.

The President informed the Society of the serious accident

which occurred yesterday to its Secretary, Dr. Burrage, and of the appointment by the Council of Dr. Goss as Secretary pro-tem.

Voted, That the Society extends its sincere sympathy to Dr. Burrage in the accident which has befallen him.

The record of the last annual meeting was read and accepted.

The Secretary announced that 125 Fellows had been admitted during the past year, that one Fellow had been restored to membership, 16 had resigned, 47 had been deprived of the privileges of fellowship, and 47 had died, making the total number of Fellows, June 8, 1910, 3334.

The following are the lists : —

Admissions reported from June 10th, 1909, to June 8th, 1910.

1910	Abbe, Elizabeth Morrison	Boston.
1909	Adamian, Parnag Adam	Boston.
1909	Allen, Fred Harold	Holyoke.
1909	Ameno, Joseph Louis	West Quincy.
1909	Barrows, Harris Clark	Gardner.
1909	Bartlett, Fred Ai	Norfolk Downs.
1909	Berry, William Christopher	Charlestown.
1909	Bieberbach, Walter Daniels	Worcester.
1910	Bixby, Oliver Edward	Saugus.
1909	Blanchard, William Herbert	Quincy.
1910	Blanchard, Winthrop Shirley	Boston.
1910	Bogan, Frederick Leon	Boston.
1910	Breen, James Henry	Hudson.
1910	Brown, Arthur Linwood	Winchester.
1909	Brown, William John	Reading.
1909	Bucholz, Carl Hermon	Boston.
1910	Burke, George Herbert	Springfield.
1909	Bush, Arthur Dermont	Watertown.
1910	Cahill, John William	Worcester.
1909	Calitri, Constant	Lawrence.
1909	Carley, Margaret Elizabeth	Boston.
1910	Carr, Arthur Wyman	Bridgewater.
1909	Ceconi, John Aloysius	Dorchester.
1910	Clark, Webster Kimball	Bernardston.
1909	Connelly, John Edward	Brookline.
1909	Cooney, Michael Edward	Northampton.
1909	Corcoran, John Gilbert	Hamilton.

1910	Crawford, Frank Wallis	South Boston.
1909	Crosbie, Arthur Hallam	Boston.
1910	Crosby, Walter Hiram	Tewksbury.
1909	Curtis, Charles Leverette	Salem.
1909	Dainty, George Wood	Somerville.
1909	Davis, Nelson Clifton	Dorchester.
1909	Devenny, Joseph Henry	Dorchester.
1910	Dillon, Michael John	Springfield.
1909	Drake, Richard Alvin	West Medford.
1909	Dunphy, Henry Ambrose	Thorndike.
1909	Eaton, Marland Hooper	Wenham.
1910	Fitz Simmons, Henry Joseph	Jamaica Plain.
1909	Flagg, Harry Howard	Charlestown.
1910	Friedmann, Nachem	Boston.
1909	Gage, Arthur Tenney	Melrose Highlands.
1909	Giddings, Harold Girard	Boston.
1909	Gilman, Florence	Northampton.
1910	Guild, Edward Frank	Chelsea.
1909	Guild, Frederick Washburn	Palmer.
1910	Hennelly, Thomas Patrick	Waltham.
1910	Hepburn, James Joseph	Boston.
1909	Holmes, Arthur Brewster	Kingston.
1910	Holmes, John Franklin	Boston.
1909	Hopkins, Alice Josephine Biggs	Boston.
1909	Howland, Charles Abel	Fall River.
1909	Hubbard, Edward Dana	Gloucester.
1909	Inglis, Harry James	Boston.
1909	Kearney, Joseph Patrick	Lowell.
1910	Keever, Henry Floyd	Auburndale.
1910	Kelleher, Jeremiah Edward	Haverhill.
1909	Kenney, Thomas Frances	Worcester.
1909	Kickham, Charles Joseph	Brookline.
1909	King, Frederick Augustine	Ipswich.
1910	King, George Clifford	Boston.
1909	Lachance, Alfred Philias	Gardner.
1909	Lane, Clarence Guy	Woburn.
1910	Laton, George Peavey	Tewksbury.
1909	Littlefield, Marion Curtis	Haverhill.
1909	Littlewood, Thomas	Gardner.
1910	Loder, Halsey Beach	Boston.
1909	Lothrop, Oliver Ames	Boston.
1910	Lucas, William Palmer	Boston.
1909	MacDonald, Donald Francis	Taunton.
1909	MacLennon, Angus Daniel	Boston.
1910	MacMillan, Jr., Andrew Louis	Hanover.
1910	MacNeil, Charles Seward Jadis	Malden.
1910	McCabe, Francis Joseph	North Easton.

1909	McCue, James Patrick	Jamaica Plain.
1909	McGaffin, Charles Gibson	Taunton.
1909	McGinley, Michael Charles	Ipswich.
1909	Marshall, Herman Weston	Boston.
1910	Mathews, Robert Francis	Worcester.
1909	May, George Elisha	Newton Centre.
1910	Miller, George Fremont	Boston.
1909	Moeckel, Carl Richard	Lawrence.
1910	Morse, Irene May	Clinton.
1909	Morse, Roy Sidney	Worcester.
1910	Naurison, James Zuslofsky	Springfield.
1909	Newhall, Harvey Field	Lynn.
1909	Newton, Roland Stephen	Westborough.
1909	Nolan, Henry Stuart	West Somerville.
1910	Noyes, Arthur Percy	East Longmeadow.
1909	O'Toole, John Lawrence	Haverhill.
1909	Page, Charles Whitney	Danvers.
1909	Page, Frank Wilfred	Boston.
1910	Piper, Fred Smith	Lexington.
1910	Philbrick, Roscoe Hunter	Northfield.
1909	Powers, Edward Parnell	Mattapan.
1910	Praino, Gaetano	Boston.
1909	Pratt, William Porter	Braintree.
1910	Pulsifer, Walter Hall	Whitman.
1910	Reid, William Duncan	Boston.
1910	Richards, Ernest Thompson Fraser	Tewksbury.
1910	Rosenbloom, Carl Webber	Holyoke.
1909	Schneider, Harry Albert	Springfield.
1910	Schillander, Carl Axel	Springfield.
1910	Shanahan, Timothy Joseph	Boston.
1910	Smith, George Gilbert	Boston.
1910	Smith, John Jay	Cambridge.
1909	Stanley, Francis Guy	Beverly.
1909	Stewart, Ralph Carroll	Lowell.
1910	Stone, George Henry	Clinton.
1910	Supple, Edward Augustine	Boston.
1909	Taylor, Charles Warren	Lowell.
1909	Tedford, Ada Helena	Woburn.
1910	Toppan, Albert Brookings	Winthrop.
1910	Tracy, William Leighton	Pittsfield.
1909	Tryon, Geneva	Cambridge.
1910	Turner, William Kenneth	New Bedford.
1910	Walker, Irving James	Boston.
1910	Wallace, Harold Lowe	Fall River.
1909	Warren, Thomas Francis	Fall River.
1909	Wentworth, Mark Hunking	Boston.
1910	West, Frederick Orra	Boston.
1910	Whelan, Edmond Vincent	Fall River.

1910	Whitney, George Burgess . .	Haverhill.
1910	Whittemore, William Stewart .	Cambridge.
1910	Wright, William Francis . .	Fall River.

Total, 125.

List of Deaths from June 16, 1909, to June 8, 1910.

Admitted.	Name.	Place of Death.	Date of Death.	Age.
1896	Allen, George Edwin	Bradford	Jan. 8, 1910	46
1873	Ayer, James Bourne	Boston	May 14, 1910	61
1895	Bartlett, Clarence Samuel	West Gardner	May 13, 1910	41
1884	Barstow, Henry Taylor	Boston	Sept. 7, 1909	51
1868	Blaisdell, Walter Channing	Everett	Nov. 14, 1909	65
1852	Blanchard, Albert Henry	Sherborn	Dec. 5, 1909	81
1883	Broderick, Thomas Joseph	Charlestown	March 5, 1910	50
1862	Brown, William Symington	Stoneham	Jan. 6, 1910	89
1902	Bruce, Frank Colverd	Northampton	Nov. 7, 1909	49
1878	Burrell, Herbert Leslie	Boston	Apr. 26, 1910	53
1880	Bushnell, Homer	North Adams	Aug. 23, 1909	66
1881	Clement, George Colburn	Haverhill	Aug. 27, 1909	54
1880	Cobb, Charles Henry	Boston	Oct. 31, 1909	64
1905	Coffrey, William Francis	Westfield	Sept. 2, 1909	35
1883	Cole, Ralph Marcus	So. Boston	March 12, 1910	52
1876	Cutter, Charles Kimball	Somerville	Nov. 11, 1909	58
1884	Dearing, Howard Sumner	Waterboro, Me.	Oct. 4, 1909	52
1887	Dexter, Ella Louise	Chestnut Hill	Feb. 3, 1910	51
1866	Dutton, Samuel Lane	Chelmsford	May 27, 1910	74
1865	Eaton, William Winslow	Danvers	Jan. 31, 1910	73
1861	Fletcher, Samuel William	Pepperell	Apr. 13, 1910	78
1854	Gage, Thomas Hovey	Worcester	Sept. 17, 1909	83
1898	Gross, Herman Williams	Quincy	Aug. 24, 1909	37
1881	Hayward, George Griswold	Boston	Feb. 6, 1910	55
1903	Hickey, James Eloi	Springfield	Dec. 4, 1909	29
1854	Hill, John Bogardus	Boston	Dec. 9, 1909	78
1888	Hoadley, Alfred Henry	Northampton	Dec. 29, 1909	54
1850	Jewett, Frederic Augustus	Grafton	Feb. 8, 1910	85
1878	Knight, Henry Sargent	Worcester	Aug. 22, 1909	55
1870	Learned, John Barr	Florence	Jan. 24, 1910	70
1885	MacDonald, William Gregory	Jamaica Plain	Feb. 9, 1910	51
1878	Meader, Charles Eugene	Lynn	Dec. 27, 1909	57
1866	Perry, Joseph Franklin	Dorchester	Dec. 31, 1909	63
1901	Pierce, Charles Willard	Allston	Oct. 9, 1909	37
1900	Prevaux, John Jacob	Haverhill	Jan. 6, 1910	52
1853	Reynolds, John Phillips	Boston	Oct. 10, 1909	84
1898	Ryder, James William	Boston	Oct. 21, 1909	41
1855	Shaw, Henry	Beachmont	March 28, 1910	80
1878	Sibley, Hartwell Augustus	Dorchester	Apr. 27, 1910	60
1864	Skinner, John	Roxbury	Dec. 28, 1909	85
1879	Thayer, Charles Paine	Atlantic City, N. J.	Feb. 1, 1910	67
1861	Thomson, George Francis	Belchertown	Dec. 23, 1909	77
1886	Wallace, Frank Huron	Boston	June 27, 1909	50
1903	Wilson, Louis Thornton	Boston	June 17, 1909	32
1868	Woodbury, George Edwin	Methuen	Dec. 27, 1909	71
1905	Woodbury, Willard Porter	Beverly	Feb. 26, 1910	31
1885	Young, Leyander John	Haverhill	Oct. 27, 1909	59

Total, 47.

Consideration of the following amendments of the By-Laws, which had been submitted in the call of the meeting, was entered upon. It was voted to consider them seriatim:—

1. Section 1 (page 9). In the fifth line—omit the word "received."

2. Section 18 (page 15). Insert after the word "President" (page 15, line 10) the following sentence:—"They shall also investigate and report cases of misconduct of which they have knowledge from any source."

3. Section 19 (page 15). In line 22—after the word "accused" insert the following phrase:—"and to all members of the District Society of which the accused is a member."

4. Committee on State and National Legislation. A new Section of the By-Laws, to be known as Section 21, to read as follows:—"The Committee on State and National Legislation shall present to the Council such information as may seem to them to call for action by the Council with regard to initiative as well as defensive work before legislative bodies."

5. By-Law 2, line 12, change the words "three months" to one month.

A prolonged and animated discussion followed, in which Drs. Harvey, Gay, Shattuck, Cotton, Stone, Willis, Cook, Osgood, Murphy, Withington, and others engaged. As a result, it was voted that Nos. 1, 3, and 5 be adopted as offered; that No. 2 be amended by the substitution of the word "may" for "shall"; and that No. 4 be not adopted.

On motion of Dr. Gay the following was passed:—

Whereas, Sanitary science and public health measures have reached a high standard of development, and have in numberless instances demonstrated their ability to conserve the health and prolong the life of the people; and

Whereas, Hundreds of thousands of persons die annually in this country from preventable diseases, and many more are made ill and idle from similar causes for varying periods of time; and

Whereas, The numerous health bureaus of the Government are now located in several departments and under as many different secretaries, thereby complicating the service, diminishing its effectiveness, and increasing the expense of maintenance; now, therefore, be it

Resolved, 1. That in the opinion of The Massachusetts Medical Society, in session assembled, the welfare of the people would be materially benefited, public health measures would be more effi-

ciently and economically administered, and the United States would thereby occupy a position among nations more in accordance with the importance of the subject and with the dignity of the Government, by the adoption of a bill embodying the principles contained in Senate Bill, No. 6049, introduced by Hon. Robert L. Owen, of Oklahoma, in March, 1910.

Resolved, 2. That the Senators and Representatives from Massachusetts be earnestly requested and urged to favor the enactment of a bill establishing a department of Public Health, with a secretary, in accordance with the principles of Senator Owen's bill.

Resolved, 3. That a copy of these resolutions, signed by the President and Secretary of the Society, be forwarded to Senators Owen, Lodge, and Crane, and to the Representatives of this State in Congress assembled.

Papers were read as follows :—

What is the Experimental Basis for Vaccine Therapy? —By Dr. Theobald Smith, Jamaica Plain. Discussion by Drs. Arthur L. Chute, Boston; Timothy Leary, Jamaica Plain.

Infantile Paralysis as an Epidemic Disease, with especial Reference to its Occurence in Massachusetts. —By Dr. Robert W. Lovett, Boston.

The Diagnosis of Infantile Paralysis in the Prodromal and Early Acute Stage as found in the Experimental Study of Acute Poliomyelitis in Monkeys.— By Dr. William P. Lucas, Boston.

At 12 o'clock, noon, the Annual Discourse was delivered by Dr. John C. Munro, of Boston, on the subject, "Dyspepsia and Indigestion Viewed from a Surgical Standpoint."

Voted, That the thanks of the Society be given to Dr. Munro for his admirable address.

The following delegates from other State Medical Societies were present :—

New Hampshire.—Drs. A. N. Sumner, George Wilkins.

Vermont.—Drs. E. R. Campbell, Lyman Allen.

Connecticut.—Drs. C. E. Taft, C. B. Graves.

Also from the Montreal Medical Society—Dr. A. Lapthorn Smith.

At 1 P.M. the annual dinner was served to about 1150 Fellows and guests.

Following the dinner many Fellows accepted an invitation to attend a field day at the Brookline Country Club.

FRANCIS W. GOSS,
Secretary pro tem.

TREASURER'S REPORT, JUNE, 1910.

Receipts.

Balance from previous year			$13,257.95
Assessments paid to District Treasurers:			
Barnstable	$150.00		
Berkshire	330.00		
Bristol North	245.00		
Bristol South	500.00		
Essex North	550.00		
Essex South	810.00		
Franklin	140.00		
Hampden	810.00		
Hampshire	300.00		
Middlesex East	355.00		
Middlesex North	420.00		
Middlesex South	1,565.00		
Norfolk	1,745.00		
Norfolk South	295.00		
Plymouth	420.00		
Suffolk	3,015.00		
Worcester	1,175.00		
Worcester North	400.00		
	$13,225.00	$13,225.00	
Assessments to Treasurer		852.00	
Assessments at Annual Meeting		995.00	
Total Assessments		$15,072.00	15,072.00
Sale of Dinner Tickets			10.00
Interest:			
Bay State Trust Co.	$136.48		
New England Trust Co.	171.07		
Institution for Savings in Roxbury	37.85		
Franklin Savings Bank	43.38		
Provident Institutions for Savings	35.30		
Suffolk Savings Bank	35.30		
Massachusetts Bonds	560.00		
Mass. Hospital Life Insurance Co.	842.33		
	$1,861.71	1,861.71	
A. T. Cabot for Committee on Tuberculosis		7.50	
		$30,209.16	$30,209.16

Expenses.

President's Expense:		
Travelling and Incidentals	$122.29	
Postage and Envelopes	17.72	
Typewriter	25.00	
	$165.01	$165.01
Secretary's Expense:		
Stenographers	$22.50	
Engrossing	12.80	
Printing	209.00	
Clerical Work	19.80	
Secretaries of Sections	10.00	
Mailing Tubes	3.25	
Legal Advice	25.00	
Office Supplies	42.30	
Postage and Incidentals	43.22	
	$387.87	387.87
Librarian's Expense:		
Index Cards	$20.50	
Lettering File	1.00	
Bookbinding	7.10	
Printing and Postal Cards	43.87	
Postage	90.00	
Delivering Communications	82.33	
	$244.80	244.80
Treasurer's Expense:		
Cards and Typewriting Card Ledger	$49.15	
Clerical Work	19.91	
Printing and Postage	88.82	
Blank Book and Paste	1.00	
Rubber Stamps	.50	
Treasurer's Bond	37.50	
Box at Bay State Trust Co.	10.00	
Carriage of Accounts at Annual Meeting	2.75	
Clerks at Annual Meeting	50.00	
	$259.63	259.63
District Treasurers' Expense:		
Commissions	$661.25	
Expenses of Collection	193.18	
	$854.43	854.43
Censors' Expense		415.00
Supervisors' Expense		22.71
Exchange		.60
Salaries		1,649.99
Rent		750.00
Amount carried forward,		$4,750.04

Amount brought forward,		$4,750.04
Shattuck Lecture		200.00
Cotting Lunch		123.00
Annual Dividend		4,500.00
Annual Meeting:		
Printing	$74.50	
Clerical Work	19.80	
Signs	28.25	
Steriopticon	20.00	
Shades	22.45	
Rent of Mechanics Hall	580.50	
Rent of Potter Hall and Incidentals	22.25	
Janitor at Medical Library	5.00	
Carpenter	135.58	
Towels and Soap	3.00	
Decorations	10.00	
Flowers	60.00	
Music	165.00	
Caterer	2,861.05	
Cigars	204.31	
	$4,211.69	4,211.69
Delegate to Committee of Am. Med. Assoc.		90.00
Committee on Publications:		
Printing	$1,469.59	
Charts	78.00	
	$1,547.59	1,547.59
Committee on State and National Legislation:		
Printing	$29.25	
Reprints and Postage	75.70	
Typewriting, Clerical Work and Postage	153.61	
Incidentals	22.40	
	$280.96	280.96
Committee on Tuberculosis:		
Walker Lithograph & Publishing Co.	$5.00	
Picture Frames	7.50	
Stenographer	10.00	
Envelopes, Stamps and Mailing	121.86	
Printing	196.00	
Draft of Report and Expressage	4.95	
"The Survey," 150 copies, paid by Dr. A. T. Cabot	7.50	
Incidentals	26.48	
	$379.29	379.29
Committee on Ophthalmia Neonatorum:		
Printing	$8.25	
Incidentals	3.50	
	$11.75	11.75
Amount carried forward,		$16,094.32

Amount brought forward,	$16,094.32	
Committee on Contract Work:		
Travel and Incidentals	21.62	
Committee on Revision of Pharmacopeia:		
Printing	111.38	
Defense of Malpractice Suits	5.00	
Delegate to Assoc. of Am. Medical Colleges	37.40	
	$16,269.72	16,269.72
Balance,		$13.939.44

Two bills amounting together to $100, and properly chargeable to the year 1909–1910, were presented too late to be paid until after the books were closed.

There were deposited in the Bay State Trust Co.	$6,994.67
" " " " " New England Trust Co.	7,160.41
There was undrawn interest in the Suffolk Savings Bank	35.30
	$14,190.38
Subtract checks still out	250.94
Balance,	$13,939.44

The permanent investments are unchanged. They are as follows: —

Cotting Fund:	
Deposit in the Roxbury Institution for Savings	$1,000.00
" " " Provident Institution for Savings	1,000.00
" " " Suffolk Savings Bank	1,000.00
Shattuck Fund:	
Annuity Bond of Massachusetts Hospital Life Ins. Co.	9,166.87
Phillips Fund:	
Massachusetts 3½ per cent. bonds	10,000.00
Permanent Fund:	
Deposit in the Franklin Savings Bank	1,074.48
Annuity Bond of Massachusetts Hospital Life Ins. Co.	11,253.30
Massachusetts 3½ per cent bonds	6,000.00
	$40,494.65

EDWARD M. BUCKINGHAM,
Treasurer.

The undersigned, a duly appointed committee, having examined the books of the Treasurer, find them correctly cast and properly vouched, and also that he has in his possession the securities called for.

HENRY S. KILBY, *Chairman.*
CHAUNCEY C. SHELDON.

Boston, May 12, 1910.

Officers of The Massachusetts Medical Society.

1910–1911.

Chosen June 7, 1910.

George B. Shattuck,	Boston,	President.
Halbert G. Stetson,	Greenfield,	Vice-President.
Walter L. Burrage,	Boston,	Secretary.
Edward M. Buckingham,	Boston,	Treasurer.
Edwin H. Brigham,	Brookline,	Librarian.

Standing Committees.

Of Arrangements.

C. C. Simmons, F. C. Kidner,
G. H. Francis, David Townsend,
A. N. Broughton, John Homans.

On Publications.

O. F. Wadsworth, G. B. Shattuck, J. C. Munro.

On Membership and Finance.

F. W. Goss, Walter Ela, C. M. Green,
A. Coolidge, Jr., Samuel Crowell.

To Procure Scientific Papers.

Christopher Seymour, E. W. Taylor, F. B. Lund,
T. J. Robinson, F. P. Denny.

On Ethics and Discipline.

Leonard Wheeler, J. A. Gage, J. W. Bartol,
Henry Jackson, G. deN. Hough.

On Medical Diplomas.

O. F. Rogers, H. W. Newhall, J. F. Burnham.

On Medical Education.

H. C. Ernst, H. D. Arnold, C. H. Williams.

On State and National Legislation.

G. B. Shattuck, C. W. Withington, G. W. Gay,
F. G. Wheatley, D. D. Scannell.

PRESIDENTS OF DISTRICT SOCIETIES.

VICE-PRESIDENTS (EX-OFFICIIS).

1910–1911.

[Arranged according to seniority.]

W. W. Pillsbury, Newburyport,	Essex North.
G. H. Monks, Boston,	Suffolk.
A. H. Hodgdon, Dedham,	Norfolk.
F. W. Taylor, Cambridge,	Middlesex South.
O. P. Porter, Lowell,	Middlesex North.
W. C. Keith, Brockton,	Plymouth.
A. C. Getchell, Worcester,	Worcester.
O. H. Howe, Cohasset,	Norfolk South.
D. M. Ryan, Ware,	Hampshire.
W. N. Cowles, Ayer,	Worcester North.
G. H. Gray, Lynn,	Essex South.
H. W. Van Allen, Springfield,	Hampden.
A. W. Buck, Fall River,	Bristol South.
E. D. Richmond, Reading,	Middlesex East.
A. V. Goss, Taunton,	Bristol North.
C. L. Upton, Shelburne Falls,	Franklin.
H. B. Hart, East Dennis,	Barnstable.
H. B. Holmes, Adams,	Berkshire.

COUNCILLORS, 1910–1911.

Barnstable	E. E. Hawes	Harwich
Berkshire	J. F. A. Adams	Pittsfield
	O. J. Brown	North Adams
	L. A. Jones	North Adams
	H. E. Stockwell	Stockbridge
Bristol North	F. A. Hubbard	Taunton
	S. D. Presbrey	Taunton
	E. Washburn	Taunton
Bristol South	W. A. Dolan	Fall River
	J. H. Gifford	Fall River
	G. deN. Hough	New Bedford
	C. A. Pratt	New Bedford
	A. P. Webber	New Bedford
	H. G. Wilbur	Fall River

Essex North	J. F. Burnham	Lawrence
	C. G. Carleton	Lawrence
	I. J. Clarke	Haverhill
	J. A. Douglass	Amesbury
	E. H. Noyes	Newburyport
	F. B. Pierce	Haverhill
	F. W. Snow	Newburyport
	F. E. Sweetsir	Merrimac
Essex South	R. E. Bicknell	Swampscott
	H. C. Boutelle	Danvers
	H. K. Foster	Peabody
	H. J. Hall	Marblehead
	A. T. Hawes	Lynn
	J. J. Hickey	Peabody
	P. P. Moore	Gloucester
	E. D. Towle	Salem
	W. E. Tucker	Ipswich
	A. M. Tupper	Rockport
Franklin	G. P. Twitchell	Greenfield
	N. P. Wood	Northfield
Hampden	E. A. Bates	Springfield
	C. J. Downey	Springfield
	M. W. Harrington	Indian Orchard
	D. E. Keefe	Springfield
	W. C. Leary	Springfield
	C. F. Lynch	Springfield
	F. P. Lowenstein	Westfield
	H. C. Martin	Springfield
	R. B. Ober	Springfield
Hampshire	J. S. Hitchcock	Northampton
	F. H. Smith	Hadley
	E. D. Williams	Easthampton
Middlesex East	J. S. Clark	Melrose
	R. T. Edes	Reading
	P. Hammond	Winchester
	A. E. Small	Melrose
Middlesex North	W. M. Jones	Lowell
	J. E. Lamoureux	Lowell
	G. H. A. Leahey	Lowell
	A. G. Scoboria	Chelmsford
	C. E. Simpson	Lowell
	C. A. Viles	Lowell
Middlesex South	G. A. Bancroft	Natick
	N. F. Chandler	Medford
	J. A. Dow	Cambridge
	A. W. Dudley	Cambridge
	G. W. Gay	Chestnut Hill
	S. R. Lancaster	Cambridge

	M. A. Morris	Charlestown
	L. M. Palmer	So. Framingham
	E. D. Pillsbury	West Somerville
	E. M. Plummer	Charlestown
	C. E. Prior	Malden
	F. W. Rice	Brighton
	G. Ryder	Malden
	W. S. Richardson	Marlborough
	E. P. Stickney	Arlington
	E. H. Stevens	Cambridge
	F. W. Taylor	Cambridge
	J. O. Tilton	Lexington
	H. S. Trueman	Somerville
	H. P. Walcott	Cambridge
	G. L. West	Newton Centre
	A. Worcester	Waltham
Norfolk	E. H. Baxter	Hyde Park
	B. S. Blanchard	Brookline
	M. J. Cronin	Roxbury.
	S. Crowell	Dorchester
	C. B. Darling	Roxbury
	F. P. Drew	East Dedham
	L. W. Gilbert	Brookline
	F. W. Goss	Roxbury
	R. W. Hastings	Brookline
	H. T. Holland	Jamaica Plain
	G. H. Ingalls	Jamaica Plain
	F. C. Jillison	West Roxbury
	G. N. Jones	Wellesley Hills
	E. B. Lane	Jamaica Plain
	R. M. Merrick	Dorchester
	T. J. O'Brien	Roxbury
	H. V. Reynolds	Dorchester
	E. T. Rollins	Jamaica Plain
	T. J. Shanahan	Brookline
	F. W. Stetson	Roxbury
	H. F. R. Watts	Dorchester
	A. G. Williams	Brookline
	A. M. Worthington	Dedham
Norfolk South	D. A. Bruce	Atlantic
	W. A. Drake	No. Weymouth
	N. S. Hunting	Quincy
Plymouth	N. K. Noyes	Duxbury
	G. Osgood	Rockland
	A. E. Paine	Brockton
	F. G. Wheatley	North Abington
Suffolk	H. D. Arnold	Boston
	S. H. Ayer	"

	F. G. Balch	Boston
	J. W. Bartol	"
	J. B. Blake	"
	E. G. Brackett	"
	E. M. Buckingham	"
	W. L. Burrage	"
	A. T. Cabot	"
	H. Cabot	"
	F. J. Cotton	"
	W. H. Devine	South Boston
	J. W. Farlow	Boston
	G. B. Fenwick	Chelsea
	R. H. Fitz	Boston
	W. H. Grainger	East Boston
	C. M. Green	Boston
	C. H. Hare	"
	F. B. Harrington	"
	J. H. McCollom	"
	J. J. Minot	"
	J. G. Mumford	"
	W. L. Richardson	"
	J. D. K. Sabine	"
	G. G. Sears	"
	F. C. Shattuck	"
	G. B. Shattuck	"
	C. C. Simmons	"
	H. F. Vickery	"
	O. F. Wadsworth	"
	J, C. White	"
	H. Williams	"
	C. F. Withington	"
	G. Wolcott	"
Worcester	W. P. Bowers	Clinton
	J. T. Duggan	Worcester
	O. H. Everett	"
	G. E. Francis	"
	R. W. Greene	"
	H. Gage	"
	E. B. Harvey	Westborough
	D. Harrower	Worcester
	E. W. Norwood	Spencer
	W. G. Reed	Southbridge
	L. F. Woodward	Worcester
	S. B. Woodward	"
Worcester North	C. E. Bigelow	Leominster
	E. P. Miller	Fitchburg
	E. A. Sawyer	Gardner
	F. H. Thompson, Sr.	Fitchburg

CENSORS, 1910–1911.

BARNSTABLE		
	E. E. Hawes, Supervisor	Harwich
	C. M. Baker	Hyannis
	C. E. Harris	Hyannis
	J. H. Higgins	Marston's Mills
	E. M. Parker	So. Yarmouth
BERKSHIRE		
	J. F. A. Adams, Supervisor	Pittsfield
	M. M. Brown	North Adams
	S. C. Burton	Pittsfield
	J. B. Thomas	Pittsfield
	A. T. Wakefield	Sheffield
BRISTOL NORTH		
	F. A. Hubbard, Supervisor	Taunton
	A. R. Crandell	Taunton
	A. S. Deane	Taunton
	D. J. Mehegan	Taunton
	T. J. Robinson	Taunton
BRISTOL SOUTH		
	W. A. Dolan, Supervisor	Fall River
	A. I. Connell	Fall River
	A. B. Cushman	South Dartmouth
	S. W. Hayes	New Bedford
	J. C. Pothier	New Bedford
ESSEX NORTH		
	F. B. Pierce, Supervisor	Haverhill
	R. M. Birmingham	Lawrence
	J. A. Fitz Hugh	Amesbury
	J. A. Magee	Lawrence
	A. C. Nason	Newburyport
ESSEX SOUTH		
	P. P. Moore, Supervisor	Gloucester
	F. W. Baldwin	Danvers
	A. N. Sargent	Salem
	H. E. Sears	Beverly
	J. F. O'Shea	Lynn
FRANKLIN		
	N. P. Wood, Supervisor	Northfield
	E. G. Best	Greenfield
	J. W. Cram	Colrain
	C. C. Messer	Turner's Falls
	C. G. Snow	Sunderland

HAMPDEN		
	W. C. Leary, Supervisor	Springfield
	D. J Brown	Springfield
	J. L. Bliss	Holyoke
	E. Flood	Palmer
	C. P. Hooker	Springfield
HAMPSHIRE		
	J. S. Hitchcock, Supervisor	Northampton
	A. M. Belden	Northampton
	J. M. Fay	Northampton
	J. Stowell, Jr.	North Amherst
	W. P. Stutson	Cummington
MIDDLESEX EAST		
	A. E. Small, Supervisor	Melrose
	J. P. Bixby	North Woburn
	G. W. Nickerson	Stoneham
	R. D. Perley	Melrose
	A. C. Lane	Woburn
MIDDLESEX NORTH		
	C. E. Simpson, Supervisor	Lowell
	W. G. Eaton	Lowell
	J. A. Gage	Lowell
	J. V. Meigs	Lowell
	E. J. Welch	Lowell
MIDDLESEX SOUTH		
	E. D. Pillsbury, Supervisor	West Somerville
	H. T. Baldwin	Chestnut Hill
	G. P. Coggswell	Cambridge
	A. Greenwood	Waltham
	J. W. Lawrence	Malden
NORFOLK		
	R. M. Merrick, Supervisor	Dorchester
	A. N. Broughton	Jamaica Plain
	C. S. Francis	Brookline
	T. F. Greene	Roxbury
	J. W. Pratt	Dedham
NORFOLK SOUTH		
	D. A. Bruce, Supervisor	Atlantic
	W. G. Curtis	Wollaston
	T. J. Dion	West Quincy
	F. E. Jones	Quincy
	F. H. Merriam	Holbrook
PLYMOUTH		
	G. Osgood, Supervisor	Rockland
	A. L. Beals	Brockton
	J. Frame	Rockland
	E. C. Frost	Brockton
	C. W. Stodder	Marshfield Hills

SUFFOLK		
	E. G. Brackett, Supervisor	Boston
	L. R. G. Crandon	Boston
	W. E. Fay	Boston
	W. F. Gay	Boston
	J. S. Stone	Boston
WORCESTER		
	R. W. Greene, Supervisor	Worcester
	W. J. Delahanty	Worcester
	J. J. Goodwin	Clinton
	A. G. Hurd	Millbury
	R. P. Watkins	Worcester
WORCESTER NORTH		
	E. P. Miller, Supervisor	Fitchburg
	J. B. Donnelly	West Gardner
	H. W. Page	Baldwinsville
	A. H. Pierce	Leominster
	E. J. Tully	Fitchburg

Commissioners of Trials.

1910–1911.

BARNSTABLE	S. H. Sears	Yarmouthport.
BERKSHIRE	J. J. Hassett	Lee.
BRISTOL NORTH	C. S. Holden	Attleborough.
BRISTOL SOUTH	G. L. Richards	Fall River.
ESSEX NORTH	J. F. Croston	Haverhill.
ESSEX SOUTH	J. E. Simpson	Salem.
FRANKLIN	F. E. Johnson	Erving.
HAMPDEN	S. F. Smith	Indian Orchard.
HAMPSHIRE	J. G. Hayes	Williamsburg.
MIDDLESEX EAST	E. S. Jack	Melrose.
MIDDLESEX NORTH	F. E. Varney	North Chelmsford.
MIDDLESEX SOUTH	F. M. Sherman	Newton.
NORFOLK	R. W. Hastings	Brookline.
NORFOLK SOUTH	G. W. Tinkham	Weymouth.
PLYMOUTH	J. H. Averill	Campello.
SUFFOLK	F. T. Murphy	Boston.
WORCESTER	E. V. Scribner	Worcester.
WORCESTER NORTH	L. G. Chandler	Townsend.

Officers of the District Medical Societies.

BARNSTABLE.—H. B. Hart, East Dennis, *President;* C. W. Milliken, Barnstable, *Vice-President;* J. P. Nickerson, West Harwich, *Secretary;* W. D. Kinney, Osterville, *Treasurer.*

BERKSHIRE —H. B. Holmes, Adams, *President;* C. S. Chapin, Great Barrington, *Vice-President;* I. S. F. Dodd, Pittsfield, *Secretary;* J. D. Howe, Pittsfield, *Treasurer.*

BRISTOL NORTH.—A. V. Goss, Taunton, *President;* A. R. Crandell, Taunton, *Vice-President;* R. D. Dean, Taunton, *Secretary;* W. Y. Fox, Taunton, *Treasurer.*

BRISTOL SOUTH.—A. W. Buck, Fall River, *President;* H. D. Prescott, New Bedford, *Vice-President;* A. J. Abbe, Fall River, *Secretary;* A. J. Abbe, Fall River, *Treasurer.*

ESSEX NORTH.—W. W. Pillsbury, Newburyport, *President;* W. H. Merrill, Lawrence, *Vice-President;* W. H. Merrill, Lawrence, *Seeretary;* J. F. Burnham, Lawrence, *Treasurer.*

ESSEX SOUTH.—G. H. Gray, Lynn, *President;* G. A. Stickney, Beverly, *Vice-President;* W. G. Phippen, Salem, *Secretary;* G. Z. Goodell, Salem, *Treasurer.*

FRANKLIN.—C. L. Upton, Shelburne Falls, *President;* LeRoy A. Newton, Greenfield, *Vice-President;* H. N. Howe, Greenfield, *Secretary;* H. N. Rowe, Greenfield, *Treasurer.*

HAMPDEN.—H. W. Van Allen, Springfield, *President;* R. H. Seelye, Springfield, *Vice-President;* P. M. Cort, Springfield, *Secretary;* P. M. Cort, Springfield, *Treasurer.*

HAMPSHIRE.—D. M. Ryan, Ware, *President;* N. C. Haskell, Amherst, *Vice-President;* A. G. Minshall, Northampton, *Secretary;* J. G. Hanson, Northampton, *Treasurer.*

MIDDLESEX EAST.—E. D. Richmond, Reading, *President;* D. C. Dennett, Winchester, *Vice-President;* F. R. Sims, Melrose, *Secretary;* C. Dutton, Wakefield, *Treasurer.*

MIDDLESEX NORTH.—O. P. Porter, Lowell, *President;* R. E. Bell, Lowell, *Vice-President;* A. R Gardner, Lowell, *Secretary;* T. B. Smith, Lowell, *Treasurer.*

MIDDLESEX SOUTH.—F. W. Taylor, Cambridge, *President;* D. E. Baker, Newtonville, *Vice-President;* W. L. Bond, West Somerville, *Secretary;* W. Ela, Cambridge, *Treasurer.*

NORFOLK.—A. H. Hodgdon, Dedham, *President;* T. J. Murphy, Roxbury, *Vice-President;* B. Kent, Dorchester, *Secretary;* G. W. Kaan, Brookline, *Treasurer.*

NORFOLK SOUTH.—O. H. Howe, Cohasset, *President;* E. N. Maybury, South Weymouth, *Vice-President;* C. S. Adams, Wollaston, *Secretary;* C. S. Adams, Wollaston, *Treasurer.*

PLYMOUTH.—W. C. Keith, Brockton, *President;* W. G. Brown, Plymouth, *Vice-President;* A. C. Smith, Brockton, *Secretary;* A. C. Smith, Brockton, *Treasurer.*

SUFFOLK.—G. H. Monks, Boston, *President;* F. B. Harrington, Boston, *Vice-President;* D. D. Scannell, Boston, *Secretary;* A. K. Stone, Boston, *Treasurer.*

WORCESTER.—A. C. Getchell, Worcester, *President;* C. A. Church, Millbury, *Vice-President;* R. J. Ward, Worcester, *Secretary;* G. O. Ward, Worcester, *Treasurer.*

WORCESTER NORTH.—W. N. Cowles, Ayer, *President;* C. J. Peirce, Shirley, *Vice-President;* W. F. Sawyer, Fitchburg, *Secretary;* F. H. Thompson, Jr., Fitchburg, *Treasurer.*

SUPPLEMENT No. III. TO CATALOGUE OF 1908.

Admissions reported from June 10th, 1909, to June 8th, 1910.

1910	Abbe, Elizabeth Morrison	Boston.
1909	Adamian, Parnag Adam	Boston.
1909	Allen, Fred Harold	Holyoke.
1909	Ameno, Joseph Louis	West Quincy.
1909	Barrows, Harris Clark	Gardner.
1909	Bartlett, Fred Ai	Norfolk Downs.
1909	Berry, William Christopher	Charlestown.
1909	Bieberbach, Walter Daniels	Worcester.
1910	Bixby, Oliver Edward	Saugus.
1909	Blanchard, William Herbert	Quincy.
1910	Blanchard, Winthrop Shirley	Boston.
1910	Bogan, Frederick Leon	Boston.
1910	Breen, James Henry	Hudson.
1910	Brown, Arthur Linwood	Winchester.
1909	Brown, William John	Reading.
1909	Bucholz, Carl Hermon	Boston.
1910	Burke, George Herbert	Springfield.
1909	Bush, Arthur Dermont	Watertown.
1910	Cahill, John William	Worcester.
1909	Calitri, Constant	Lawrence.
1909	Carley, Margaret Elizabeth	Boston.
1910	Carr, Arthur Wyman	Bridgewater.
1909	Ceconi, John Aloysius	Dorchester.
1910	Clark, Webster Kimball	Bernardston.
1909	Connelly, John Edward	Brookline.
1909	Cooney, Michael Edward	Northampton.
1909	Corcoran, John Gilbert	Hamilton.
1910	Crawford, Frank Wallis	South Boston.
1909	Crosbie, Arthur Hallam	Boston.
1910	Crosby, Walter Hiram	Tewksbury.
1909	Curtis, Charles Leverette	Salem.
1909	Dainty, George Wood	Somerville.
1909	Davis, Nelson Clifton	Dorchester.
1909	Devenny, Joseph Henry	Dorchester.
1910	Dillon, Michael John	Springfield.

1909	Drake, Richard Alvin	West Medford.
1909	Dunphy, Henry Ambrose	Thorndike.
1909	Eaton, Marland Hooper	Wenham.
1910	Fitz Simmons, Henry Joseph	Jamaica Plain.
1909	Flagg, Harry Howard	Charlestown.
1910	Friedmann, Nachem	Boston.
1909	Gage, Arthur Tenney	Melrose Highlands.
1909	Giddings, Harold Girard	Boston.
1909	Gilman, Florence	Northampton.
1910	Guild, Edward Frank	Chelsea.
1909	Guild, Frederick Washburn	Palmer.
1910	Hennelly, Thomas Patrick	Waltham.
1910	Hepburn, James Joseph	Boston.
1909	Holmes, Arthur Brewster	Kingston.
1910	Holmes, John Franklin	Boston.
1909	Hopkins, Alice Josephine Biggs	Boston.
1909	Howland, Charles Abel	Fall River.
1909	Hubbard, Edward Dana	Gloucester.
1909	Inglis, Harry James	Boston.
1909	Kearney, Joseph Patrick	Lowell.
1910	Keever, Henry Floyd	Auburndale.
1910	Kelleher, Jeremiah Edward	Haverhill.
1909	Kenney, Thomas Frances	Worcester.
1909	Kickham, Charles Joseph	Brookline.
1909	King, Frederick Augustine	Ipswich.
1910	King, George Clifford	Boston.
1909	Lachance, Alfred Philias	Gardner.
1909	Lane, Clarence Guy	Woburn.
1910	Laton, George Peavey	Tewksbury.
1909	Littlefield, Marion Curtis	Haverhill.
1909	Littlewood, Thomas	Gardner.
1910	Loder, Halsey Beach	Boston.
1909	Lothrop, Oliver Ames	Boston.
1910	Lucas, William Palmer	Boston.
1909	MacDonald, Donald Francis	Taunton.
1909	MacLennon, Angus Daniel	Boston.
1910	MacMillan, Jr., Andrew Louis	Hanover.
1910	MacNeil, Charles Seward Jadis	Malden.
1910	McCabe, Francis Joseph	North Easton.
1909	McCue, James Patrick	Jamaica Plain.
1909	McGaffin, Charles Gibson	Taunton.
1909	McGinley, Michael Charles	Ipswich.
1909	Marshall, Herman Weston	Boston.
1910	Mathews, Robert Francis	Worcester.
1909	May, George Elisha	Newton Centre.

1910	Miller, George Fremont	Boston.
1909	Moeckel, Carl Richard	Lawrence.
1910	Morse, Irene May	Clinton.
1909	Morse, Roy Sidney	Worcester.
1910	Naurison, James Zuslofsky	Springfield.
1909	Newhall, Harvey Field	Lynn.
1909	Newton, Roland Stephen	Westborough.
1909	Nolan, Henry Stuart	West Somerville.
1910	Noyes, Arthur Percy	East Longmeadow.
1909	O'Toole, John Lawrence	Haverhill.
1909	Page, Charles Whitney	Danvers.
1909	Page, Frank Wilfred	Boston.
1910	Piper, Fred Smith	Lexington.
1910	Philbrick, Roscoe Hunter	Northfield.
1909	Powers, Edward Parnell	Mattapan.
1910	Praino, Gaetano	Boston.
1909	Pratt, William Porter	Braintree.
1910	Pulsifer, Walter Hall	Whitman.
1910	Reid, William Duncan	Boston.
1910	Richards, Ernest Thompson Fraser	Tewksbury.
1910	Rosenbloom, Carl Webber	Holyoke.
1909	Schneider, Harry Albert	Springfield.
1910	Schillander, Carl Axel	Springfield.
1910	Shanahan, Timothy Joseph	Boston.
1910	Smith, George Gilbert	Boston.
1910	Smith, John Jay	Cambridge.
1909	Stanley, Francis Guy	Beverly.
1909	Stewart, Ralph Carroll	Lowell.
1910	Stone, George Henry	Clinton.
1910	Supple, Edward Augustine	Boston.
1909	Taylor, Charles Warren	Lowell.
1909	Tedford, Ada Helena	Woburn.
1910	Toppan, Albert Brookings	Winthrop.
1910	Tracy, William Leighton	Pittsfield.
1909	Tryon, Geneva	Cambridge.
1910	Turner, William Kenneth	New Bedford.
1910	Walker, Irving James	Boston.
1910	Wallace, Harold Lowe	Fall River.
1909	Warren, Thomas Francis	Fall River.
1909	Wentworth, Mark Hunking	Boston.
1910	West, Frederick Orra	Boston.
1910	Whelan, Edmond Vincent	Fall River.
1910	Whitney, George Burgess	Haverhill.
1910	Whittemore, William Stewart	Cambridge.
1910	Wright, William Francis	Fall River.

List of Deaths from June 16, 1909, to June 8, 1910.

Admitted.	Name.	Place of Death.	Date of Death.	Age.
1896	Allen, George Edwin	Bradford	Jan. 8, 1910	46
1873	Ayer, James Bourne	Boston	May 14, 1910	61
1895	Bartlett, Clarence Samuel	West Gardner	May 13, 1910	41
1884	Barstow, Henry Taylor	Boston	Sept. 7, 1909	51
1868	Blaisdell, Walter Channing	Everett	Nov. 14, 1909	65
1852	Blanchard, Albert Henry	Sherborn	Dec. 5, 1909	81
1883	Broderick, Thomas Joseph	Charlestown	March 5, 1910	50
1862	Brown, William Symington	Stoneham	Jan. 6, 1910	89
1902	Bruce, Frank Colverd	Northampton	Nov. 7, 1909	49
1878	Burrell, Herbert Leslie	Boston	Apr. 26, 1910	53
1880	Bushnell, Homer	North Adams	Aug. 23, 1909	66
1881	Clement, George Colburn	Haverhill	Aug. 27, 1909	54
1880	Cobb, Charles Henry	Boston	Oct. 31, 1909	64
1905	Coffrey, William Francis	Westfield	Sept. 2, 1909	35
1883	Cole, Ralph Marcus	So. Boston	March 12, 1910	52
1876	Cutter, Charles Kimball	Somerville	Nov. 11, 1909	58
1884	Dearing, Howard Sumner	Waterboro, Me	Oct. 4, 1909	52
1887	Dexter, Ella Louise	Chestnut Hill	Feb. 3, 1910	51
1866	Dutton, Samuel Lane	Chelmsford	May 27, 1910	74
1865	Eaton, William Winslow	Danvers	Jan. 31, 1910	73
1861	Fletcher, Samuel William	Pepperell	Apr. 13, 1910	78
1854	Gage, Thomas Hovey	Worcester	Sept. 17, 1909	83
1898	Gross, Herman Williams	Quincy	Aug. 24, 1909	37
1881	Hayward, George Griswold	Boston	Feb. 6, 1910	55
1903	Hickey, James Eloi	Springfield	Dec. 4, 1909	29
1854	Hill, John Bogardus	Boston	Dec. 9, 1909	78
1888	Hoadley, Alfred Henry	Northampton	Dec. 29, 1909	54
1850	Jewett, Frederic Augustus	Grafton	Feb. 8, 1910	85
1878	Knight, Henry Sargent	Worcester	Aug. 22, 1909	55
1870	Learned, John Barr	Florence	Jan. 24, 1910	70
1885	MacDonald, William Gregory	Jamaica Plain	Feb. 9, 1910	51
1878	Meader, Charles Eugene	Lynn	Dec. 27, 1909	57
1866	Perry, Joseph Franklin	Dorchester	Dec. 31, 1909	63
1901	Pierce, Charles Willard	Allston	Oct. 9, 1909	37
1900	Prevaux, John Jacob	Haverhill	Jan. 6, 1910	52
1853	Reynolds, John Phillips	Boston	Oct. 10, 1909	84
1898	Ryder, James William	Boston	Oct. 21, 1909	41
1855	Shaw, Henry	Beachmont	March 28, 1910	80
1878	Sibley, Hartwell Augustus	Dorchester	Apr. 27, 1910	60
1864	Skinner, John	Roxbury	Dec. 28, 1909	85
1879	Thayer, Charles Paine	Atlantic City, N. J.	Feb. 1, 1910	67
1861	Thomson, George Francis	Belchertown	Dec. 23, 1909	77
1886	Wallace, Frank Huron	Boston	June 27, 1909	50
1903	Wilson, Louis Thornton	Boston	June 17, 1909	32
1868	Woodbury, George Edwin	Methuen	Dec. 27, 1909	71
1905	Woodbury, Willard Porter	Beverly	Feb. 26, 1910	31
1885	Young, Leyander John	Haverhill	Oct. 27, 1909	59

The following has been restored to the privileges of membership:

George Hartley Gorham, Tabernilla, Canal Zone.

The following have been placed on the retired list:

F. H. Brown, Boston.
Normal Call, Brookline.
Algernon Coolidge, Boston.
Edward Cowles, Plymouth.
Bennett F. Davenport, Watertown.
James S. Greene, Dorchester.
E. E. Mather, Williamstown.
James A. McDonald, Charlestown.
Charles B. Purvis, Brookline.
George L. Rice, North Adams.
Frank T. Vinal, Scituate.
E. T. Williams, Roxbury.

Resignations of the following have been accepted:

Lilley Eaton, Richmond, Va.
William F. Farmer, Tewksbury.
R. H. Goldthwaite, U. S. A.
Fletcher Hodges, Indianapolis.
Edwin R. Lewis, Clinton.
Edward A. McCullough, Meriden, Ct.
Henry E. Marston, Pittsfield, Me.
Clarence E. Meramble, Lynn.
Malcolm D. Miller, Brookline.
Philip S. Potter, North Adams.

The following have been deprived of the privileges of fellowship for non-payment of dues:

C. B. Adams, New York City.
Eva A. Adams, Brunswick, Me.
J. F. R. Biron, Amesbury.
H. A. Brown, Whitinsville.
G. S. Cahill, Cambridge.
G. L. Closson, address unknown.
B. C. Darling, Kansas City, Mo.
S. Delano, Boston.
C. Dudley, Cambridge.
W. G. Dwinell, Pawtucket, R. I.
R. C. Fish, Worcester.

E. M. Frissell, Webster.
M. Gerstein, Roxbury.
W. A. Greene, Charlton City.
G. H. Gorham, Tabernilla, Canal Zone.
J. C. Graves, Jr., Spokane, Wash.
J. J. Hanley, Denver, Colo.
Mabel S. Haynes, address unknown.
C. W. Hoyt, Rochester, N. Y.
A. A. Keeley, Fall River.
H. W. Knight, Saco, Me.
W. G. Lee, Chicago, Ill.
W. J. Leonard, Springfield.
J. D. McCauley, Cambridge.
F. A. Mackenzie, Roxbury.
R. H. McNair, Longmeadow.
Q. H. Merrill, Dudley.
J. M. Murphy, Malden.
H. P. Nottage, Oakland, Cal.
O. S. O'Brien, Rockport.
E. E. O'Donnell, Brockton.
C. H. Phillips, Beverly.
E. F. Pope, Spokane, Wash.
A. H. Prouty, North Brookfield.
Caroline T. Reed, Cambridge.
D. Robinson, Portland, Oregon.
E. F. Ross, Wales.
J. E. Rourke, Dorchester.
C. B. Russell, Paterson, N. J.
E. B. Schallenbach, Chelsea.
M. C. Schroeder, New York City.
F. W. Seymour, Rochester, N. Y.
W. D. Shurtleff, Kingston.
D. M. Trecartin, Bridgeport, Ct.
R. H. Wald, Hastings, Minn.
E. de W. Wales, Indianapolis, Ind.
Julia R. Youngman, address unknown.

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